

POULTRY GLOSSARY

Compiled by

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Abdomen: the ventral portion of the body approximately posterior to the ribs.

Abdominal capacity: an evaluation of a hen (part of handling quality) giving an indication of the state of egg production. Determined by using the hand to estimate the distance between the ends of the pubic bones and between the tips of the pubic bones and the end of the keel (breast bone).

Abdominal cavity: the posterior portion of the body cavity. It is often the site of excessive fat deposition. See also Thoracic cavity.

Acclimation: adaptation in response to a climatic variable, usually in controlled chambers.

Acclimatization: long-term physiological adaptation resulting in increased tolerance to repeated or continuous exposure to multiple climatic stressors, usually under natural conditions.

Acidosis: unusually high level of acidity in the blood or tissues.

Acrosome: the anterior pointed apex of the head-piece of the avian sperm.

Acute: a condition that is relatively short and severe, but not chronic.

Adaptation: physiological, behavioral, genetic or other changes that favor the welfare, survival and reproduction of an animal in a particular environment.

Additive: a substance added to the diet that is not a natural nutritive ingredient. This includes medications, pigments, flavorings, enzymes, prebiotics, probiotics, etc.

Additive gene: a gene which has greater expression in the homozygous state than in the heterozygous state or which influences degree rather than kind of expression.

Addled egg: 1) egg with mixed albumen and yolk, sometimes caused by shaking or jarring; 2) rotten or dead embryo.

Adenovirus: a group of viruses so-named because they were often isolated from adenoids and tonsils of humans. They are known to cause Inclusion Body Hepatitis, Aplastic anemia, Egg Drop syndrome, immune suppression and respiratory infections.

Adjuvant: additive to a vaccine to enhance its effectiveness.

Ad libitum: available free choice at all times (e.g., feed or water).

Adrenal glands: a pair of oval or triangular yellow glands located near the anterior tip of the kidneys. Produce several hormones including corticosterone, aldosterone, cortisone, adrenaline, progesterone, testosterone, estradiol, epinephrine, norepinephrine and others. Affects homeostasis, stress responses, reproduction, circulatory system, kidney and others. Involved in the “fight or flight” behavior.

Aerobic: bacteria that require air (oxygen) to grow.

Aerosol: a very fine mist produced by forcing a liquid through a small nozzle. It has application in spraying or fogging water or germicidal solutions in enclosed spaces such as incubators, rooms, and egg coolers.

Aflatoxin: toxins produced by various molds; often contaminate feed ingredients and prepared feed.

Afterfeather, aftershaft: a secondary feather attached to the underside of a contour feather. Primary function is insulation.

Agglutination test: microorganisms cause the body to produce antibodies that are found in the blood. An antigen for an organism mixed with a drop of blood will cause the agglutination or sticking together of antigen and antibodies, if the antibody for the microorganism is present, resulting in visible clumps. A positive test indicates that the bird has been exposed to the organism.

Ahemeral: artificial daylengths that are more or less than 24 hours.

Air cell or space: a space between the inner and outer shell membranes, usually in the large end of the egg, which contains air. It can be used as one indication of age and quality of eggs for consumption. Embryologically, it provides an air source for the beginning of lung respiration before the shell is broken during the hatching process.

Air chilled: cooling processed carcasses using cold air as opposed to cold water.

Air jet: a stream of air coming from an air inlet in a negative pressure ventilation system.

Air sacculitis: inflammation of the air sacs.

Air sacs: very thin-walled membraneous sacs containing air and connected with the lungs. Some act as bellows in the respiration process moving air through the lungs where gas exchange occurs. Some penetrate into the hollow bones. Minor functions include heat exchange and lightness. There are 9 in the chicken (paired cervical, cranial thoracic, caudal thoracic and abdominal, and an unpaired interclavicular) but the number varies across species.

Albumen: the white of an egg. The layers are chalaziferous (chalaza), which is attached to the yolk, inner thin, thick, and outer thin. It comprises approximately 60% of the egg weight and 67% of the contents in a chicken egg. The albumen furnishes most of the water and slightly more than half of the protein required by the embryo.

Albumin: a type of protein found in plants and animals, including egg albumen.

Alektorophobia: the fear of chickens.

Alkalosis: unusually high level of alkalinity in the blood or tissues.

Allantois or allantoic membrane: an embryonic membrane that grows from the umbilical area to the shell and fuses with the chorion membrane to form the chorioallantois membrane. This membrane grows around the inner surface of the shell enclosing all of the egg contents and embryo. Its primary functions are respiration, absorption of the albumen, waste containment, moisture exchange and mineral absorption from the shell.

Allel: one of a pair of genes that can occur at the same locus on a chromosome.

Allergy: hypersensitivity of a bird to a particular substance.

All-in All-out: a flock of birds enters and exits a facility as a single group. New birds are not introduced and flocks are not mixed. This strategy minimizes the risk of new birds introducing disease agents into a flock.

Allometry: the study and measurement of the size or growth of a body part relative to the whole body.

Altricial: birds that usually have little down at hatching and that are not mobile, thus unable to leave the hatching area. See Precocial, Nidicolous and Nidifugous.

American Standard of Perfection: a publication of The American Poultry Association, Inc. that describes each breed of poultry recognized by that organization; it is used as a basis for judging exhibition birds by breed.

Amino acid: primary organic chemical units that combine to form various proteins. Those considered essential in the diet are: methionine, threonine, lysine, arginine, glycine, histidine, leucine, isoleucine, tryptophan, phenylalanine, and valine.

Ammonia: a gas (NH₃) that is a common environmental pollutant in poultry houses.

Amnion or amniotic membrane: a thin-walled embryonic membrane that completely encloses the embryo early in incubation. It is filled with a clear fluid (amniotic fluid) which bathes and protects the embryo. It provides shock absorption and prevents embryonic adherence to other egg structures.

Anabolism: process by which food is converted in living tissue to useful substances.

Anaerobic: bacteria that grow without air or oxygen.

Anatidae: the family of birds including ducks, geese, swans and others.

Anatinae: the branch of family Anatidae that includes ducks.

Anatomy: the science of the structure or morphology of an animal or other organism.

Androgen: hormone produced primarily in the testes and is involved in semen production and the presence of male secondary sex characteristics.

Anemia: an abnormally low number of red blood cells in the circulatory system.

Anemometer: an instrument used to measure air speed; usually in feet per minute (fpm).

Animal and Plant Health Inspection Service (APHIS): the USDA agency that oversees animal health, importation and exportation.

Anion: an ion having a negative charge. See also Cation.

Anionic detergent: a substance having disinfectant activity because of the presence of an active negatively-charged ion or group.

Annual cycles: birds under natural conditions go through cycles of feather molting, fat deposition, reproduction, and migration. There are wide variations among species in these cycles. The cycles are influenced by light, temperature, rainfall, food availability, global location and other factors.

Anomaly: deviation from normal; abnormal.

Anophthalmia: a condition in some embryos in which the eyes are absent.

Anorexia: low appetite or loss of appetite.

Anoxia: a deficiency of oxygen.

Anserinae: the branch of family Anatidae that includes the goose.

Antemortem: before death.

Antemortem inspection: inspection of birds just before slaughter.

Anthelmintic: a drug to treat against parasitic worms (helminthes), mainly in the intestinal tract.

Antibiotic: a substance produced by a microorganism that destroys or inhibits growth of bacteria or other microorganisms. Used to treat bacterial diseases and for growth promotion of the bird. A broad-spectrum antibiotic affects multiple types of microorganisms.

Antibody: a protein produced by the body in response to exposure to a foreign substance, or antigen, which will neutralize the antigen and provide immunity.

Anticoccidial: a drug or chemical used to prevent or treat coccidiosis.

Antigen: a substance to which the body reacts to produce an antibody.

Antioxidant: a substance which reduces oxidation of fats, oils and other compounds; removes and prevents buildup of metabolic byproducts which have toxic effects. They may be added to the feed prior to storage to maintain vitamin potency. Vitamins C and E have antioxidant properties.

Antipyretic: a substance that will reduce fever.

Antirachitic: prevents rickets; vitamin D is antirachitic.

Antiseptic: a substance that has antimicrobial properties but may not kill them.

Antiserum: serum from an animal that has a high titer against an antigen and which, when injected into another animal, will confer a low level of passive immunity.

Antitoxin: serum from an animal that has a high titer against a specific toxin and which, when injected into another animal, will confer some protection against that toxin.

Aorta: large artery exiting the heart carrying oxygenated blood to the body.

Aortic rupture: tearing of the aorta or main artery leaving the heart causing sudden death. Turkeys and very heavy birds are most susceptible.

Apoptosis: process of programmed cell death.

Aposia: absence or avoidance of drinking.

Arboreal: adapted to tree-living; living in trees.

Area opaca: in the early stages of a developing blastoderm it is the white outer ring surrounding the inner translucent area (area pellucida) in which the embryo first forms.

Area pellucida: in the early stages of a developing blastoderm it is the central translucent area in which the embryo first forms, and which is surrounded by a white ring (area opaca).

Area vasculosa: the area around the early embryo in which blood is first formed; blood islands form, and then develop into a vascular system that is connected to the embryo.

Artery: vessels that transport blood away from the heart. Compare Vein.

Arthritis: inflammation of a skeletal joint.

Artificial insemination: a technique in which semen is collected from the male and deposited, with or without dilution, in the vagina of the female. Currently used in almost all

commercial turkey breeding operations, in some exotic bird species, and in research and pedigree matings.

Ascarid: the round worm that infests the small intestine. See Roundworm.

Ascites: a condition (pulmonary hypertension syndrome) found in higher incidence in broilers grown at higher altitudes, somewhat similar to congestive heart failure with right ventricular dilation. Usually results in accumulation of fluid in the abdominal cavity and increased mortality.

Ascorbic acid: vitamin C; an antioxidant, not considered to be essential in the diet of birds because it is produced in the body.

Aseptic: clean, sanitary and without contamination.

Aspergillosis: an infection, commonly in the respiratory tract, caused by the fungus, *Aspergillus*; causes morbidity, and in some cases, high mortality. Young chicks are very susceptible, often acquiring the infection from the litter in the brooding area or while still in the hatchery. Also called brooder pneumonia.

Ataxia: lack of coordinated muscular movements as in epidemic tremors or “crazy chick disease”.

Atlas: the vertebra of the spinal column which articulates with the skull.

Atresia: degenerative changes or absorption of ovarian follicles.

Atrophy: decrease in size or strength or the wasting away of tissue or organs, as by nutritional deficiency, disease, or physiology (normal or abnormal).

Attenuate: to lessen in severity. Attenuated micro-organisms may be used for vaccination with an associated mild occurrence of the disease.

Auger: 1) a mechanical device for moving feed or other material through a tube using the screw principle, similar to Archimedian screw. 2) Also a tool for boring holes.

Auricle: one of the top two chambers of the heart; an atrium; the right receives deoxygenated blood from the body and the left receives oxygenated blood from the lungs.

Autosexing: determining the gender of the chick by a characteristic such as feather color or feather growth. Obtained by using sex-linked genetic characteristics.

Autosome: any chromosome that is not a sex chromosome.

Available: in respect to nutrients, it is that part or form of nutrient (e.g., phosphorus) which can be absorbed and utilized by the body.

Avian: having to do with birds (aves).

Avian Encephalomyelitis: an infectious viral disease characterized by ataxia and tremors of the head and neck, usually in young chicks. Also called Epidemic Tremors.

Avian Influenza: a respiratory disease caused by a virus similar to those causing human influenza. The mild form causes decreased egg production and low mortality, whereas the acute form causes high mortality and affects multiple body systems.

Aviary system: a management system that usually includes deep litter, perches and slatted floor at various levels as an alternative system to battery cages.

Avidin: a protein found in small amounts in egg albumen that has a capacity to bind biotin.

Avitaminosis: a condition caused by a vitamin deficiency. Hypovitaminosis may be more correct in many cases.

Axial feather: a small feather between the primary and secondary flight feathers on the wing.

B-cells: lymphocytes derived from the bursa of Fabricius and produced in the bone marrow. Involved with humoral immunity.

Bacillary white diarrhea: disease caused by the bacterium *Salmonella Pullorum* resulting in high mortality in embryos and young chicks. Controlled by blood testing breeding stock and removing reactor birds identified by agglutination test, use of antibacterial agents on eggs, and strict sanitation programs.

Bacitracin: antibiotic used in poultry and other species

Backcross: a breeding procedure in which a crossbred is mated to one of its parents or parental types.

Backyard flock: a small, noncommercial poultry flock kept for home use, showing, or other purposes.

Bacteria: single-celled micro-organisms containing no chlorophyll that often cause diseases.

Bactericide: a substance that has capability of killing bacteria.

Bacterin: a suspension of killed bacteria used to produce immunity when injected.

Bacteriocins: peptide compounds produced by ribosomes of some bacteria that have a narrow range of antimicrobial activity.

Bacteriostat: a substance that prevents bacteria from propagating.

Baffled ventilation: baffles or obstructive devices in the poultry house air intake prevents direct air flow and moderates rate of flow.

Balanced diet: a diet formulated to contain all known essential nutrients in amounts necessary for ideal growth, development, production and health for a specific type of bird, age of bird, and intended use for the bird. Efficiency of utilization, excess excretion, and economics are also considerations.

Bantam: a small type of chicken, many of which are dwarfs of standard breeds; usually are ornamental breeds.

Bantam Standard: a publication of the American Bantam Association that describes the characteristics of bantam poultry; used as a basis of judging exhibition birds.

Barb: the branches or projections from either side of the rachis or shaft of a feather, which in turn have barbules and barbicels as substructures.

Barbicels: hooks and flanges of the feather barbule. Flanges are on the proximal side and hooks on the distal side of the barbule.

Barbule: projections from either side of the feather barb, each with the substructures, barbicels.

Barnyard chicken: a chicken of mixed breeds; common in small home flocks.

Barring: alternate stripes across the feather in some breeds. It can be determined by an autosomal gene, as in Dominiques, or sex-linked dominant gene, as in Barred Plymouth Rocks. Sex-linked barring can be used for autosexing purposes.

Basal metabolic rate (BMR): the minimal heat production of a normal bird that is awake, resting, and fasting (post-absorptive state) at an ambient temperature causing neither regulatory thermogenesis or energy for active evaporative cooling (thermoneutral zone). Standard metabolic rate (SMR) is with birds resting, fasting and in a temperature below thermoneutral zone. Resting metabolic rate (RMR) is measured when birds are resting but not fasting and may be at a temperature below thermoneutral zone.

Basted: the industry practice of injecting a specific volume of liquid into raw poultry and poultry parts to improve tenderness, juiciness, or flavor and to improve cooking time.

Battery cages: cages, usually made of wire, that are used to keep hens or growing birds. They may be stacked in moveable units or in stationary long rows of one or more levels.

Beak: the upper and lower mandibles of a bird forming the forward mouth parts. See Bill.

Beak-trimming: removing a portion of the beak tip to reduce feather pecking, cannibalism and egg eating. Usually accomplished with a machine that cuts and/or cauterizes the beak. It often is done with young chicks and usually involves only the upper beak but in some procedures both upper and lower beaks are trimmed.

Bean: 1) a hard, rounded bulge on the tip of the upper bill of waterfowl. 2) Also the seed of some plants, many of which are edible.

Beard: 1) cluster of enlarged feathers growing from the throat area; 2) also applies to the tuft of long, coarse string-like feathers on the central breast of the adult male turkey.

Bedding: wood shavings or other material placed on the floor of a pen to absorb manure and moisture. See Litter.

Bevy: a flock of quail or swan.

Bile: a green, viscous secretion of the liver; stored in the gall bladder; released into the posterior duodenum; involved in digestion, especially of lipids.

Bill: the upper and lower mandibles of waterfowl forming the mouth. See Beak.

Billing out: use of the beak or bill to knock feed out of a feeder.

Bioassay: quantitative or qualitative determination of a substance using living test subjects.

Bioavailability: the proportion of the ingested element that is absorbed, transported to the site of action and converted to a physiologically active form.

Biochemical Oxygen Demand (BOD): a quantitative measure of the oxygen needed by bacteria and micro-organisms for the biological oxidation of organic wastes in a unit volume of waste water.

Biocide: a substance poisonous to living organisms.

Bioclimatology: the science concerned with the effects of climate on living organisms.

Biomittent: see Intermittent lighting.

Biosecurity: procedures such as sanitation and isolation used to prevent disease exposure to birds or premises.

Biotin: water-soluble vitamin essential to the bird. It is especially vital for normal embryonic development and normal skin and foot pads in chicks.

Bird: an animal of the class Aves that is two-legged, warm blooded, egg-laying vertebrate with wings and feathers (the most unique characteristic).

Blackhead: the disease Enterohepatitis Histomoniasis, more common in turkeys and some game birds; common symptoms are sulfur colored droppings, lethargy, and liver lesions. See Histomoniasis, Heterakis and cecal worm.

Black-out house: houses that do not allow any natural light into the building

Black vomit (Vomito Negro): a toxic condition more common in Central and South America. A black fluid is often found in the crop, proventriculus and gizzard. The cause appears to be poor quality fish meal.

Blade: the lower, unserrated portion of the single comb.

Blast freeze: rapid lowering of carcass temperature, usually with very cold air (about -30°C) with exposure time varying with temperature. Also referred to as Quick Freeze or Deep Freeze.

Blastoderm: the early-stage developing embryo, which appears macroscopically as a donut shaped spot on the yolk at the time of oviposition. It is underneath the vitelline membrane. See Germinal disc.

Blastodisc: the germinal area of a nonfertilized ovum; it appears on the surface of the yolk as a small white spot.

Bleaching: fading of the yellow pigment from the skin, beak, shanks and vent of a hen during egg production.

Blind gut: see Cecum

Blood group: birds classified according to antigens produced and determined by blood agglutination tests.

Blood islands: beginning of the formation of blood and circulatory system in the embryo.

Blood ring: a crescent-shaped ring of blood accumulated near the shell of eggs in which the embryo died during early stages of incubation.

Blood spots: inclusions in the egg albumen or on the yolk surface that are comprised of blood from the ovary or pieces of tissue from the ovary or oviduct. See Meat spots.

Blood streaks: blood smeared on the eggshell surface during oviposition resulting from bleeding from the oviduct.

Blood test: blood collected for agglutination (e.g., pullorum test) or other types of tests.

Bloom: the gloss or shine of the outer surface of the eggshell, primarily because of the cuticle. See Cuticle.

Blowout: damage and collapse of the vent and oviduct; usually caused by the laying of an oversize egg.

Blue eggs: eggshells with blue to green color; characteristic of the Araucanas breed but has simple inheritance and thus can be bred into any other breed. One pigment involved is oocyan.

Bobwhite quail: relatively small ground-dwelling game birds (*Colinus virginianus*) of N. America that are raised domestically for stocking hunting preserves and to a lesser degree for meat and eggs.

Body check: an egg with the shell broken while still in the hen's oviduct.

Body temperature: most domestic birds thermoregulate to a body temperature of 41 to 42°C (105.8 to 107.6°F). Some birds, such as ostrich, have lower temperature and others will become temporarily torpid. The upper lethal body temperature in the chicken is 115 to 116.6°F (46.1 to 47.0°C).

Bone: the hard dense tissue of the skeleton comprised primarily of calcium and phosphorus with a protein matrix.

Boning: removal of the muscle, fat and skin from the skeleton. Also called deboning.

Booted: feathers on toes, shanks and hocks. Feather legged.

Botulism: a pathological paralytic condition caused by consumption of a toxin produced by *Costridium botulinum*. Sometimes referred to as "limber-neck".

Brace: flock of ducks.

Brachial: refers to the wing.

Brain: large mass of neural tissue located in the head; part of the central nervous system; the coordinating center of impulses received and transmission of impulses sent.

Brassy: a yellowish tint sometimes seen in white-feathered birds.

Breakers: companies that process eggs into egg products.

Breaking eggs: shell eggs designated for cracking (breaking) to produce egg products

Break-out: examination of unhatched eggs following incubation to determine the cause of failure to hatch.

Break-up: actions taken to prevent a hen from incubating eggs.

Breast: the chest portion of the bird consisting primarily of the clavicle and keel bones and the flight muscles (Pectoralis major and pectoralis minor).

Breast blister: a water cyst or blister on the breast along the keel; often caused by poor litter conditions.

Breed: 1) a group of birds having similar body shape and weight characteristics and when mated together produce offspring with those same characteristics. A breed may contain one or more varieties that are distinguished by different comb, color or other specific trait.
2) To mate and produce offspring.

Breeder: 1) a sexually mature bird used for breeding purposes to produce eggs for hatching. 2) Also, a person, company, or organization that breeds poultry.

Breed true: the characteristic of a group of birds, or breed, in which the offspring exhibit the same identifying qualities as the parents.

Brewer's grains: the residual materials from grains used in the brewery industry that can be used as a feed ingredient.

Broad spectrum: an antibiotic or drug that is effective against several microorganisms.

Broiler: a young meat type bird that can be cooked in a variety of ways, including frying, baking, and broiling. The most common type of chicken meat marketed as whole, cut-up, further processed entrees, and by fast food restaurants. Most commercial strains are primarily derived from Cornish and Plymouth Rock breeds.

Broiler breeder: breeders that produce hatching eggs for commercial broiler production.

Bronchi: large air passages of the lungs.

Bronze: a metallic copper color seen in feathers of some chickens and turkeys and describes the color of the Bronze turkey.

Brood: 1) a group of birds hatched at the same time and cared for together by the parent.
2) To sit on eggs for incubation or to provide protection, food and water for the chicks.

Brooder: a heating unit that provides supplemental heat in a draft-free house for young birds.

Brooder pneumonia: see Aspergillosis.

Broodiness or broody: maternal behavior of the bird in which there is a desire to sit on eggs for incubation and care for the young. It has been decreased in commercial strains by genetic selection. See Brood patch.

Brooding: providing heat, shelter, food and protection for a flock of birds. A brooding hen is one that is caring for her young chicks.

Brood patch: an area on the breast that loses feathers in a brooding hen allowing skin contact with eggs being incubated. Vasodilation of skin in this area may occur to increase temperature to the eggs.

Broody coop or cage: a small enclosure in which broody hens are placed to induce them to stop broody behavior.

BTU: British thermal unit. The heat required to raise the temperature of one pound of water from 39°F to 40°F. One mean BTU = 252.1 calories = 1054.8 joule.

Buff: a medium yellow-orange shade of feather color.

Built-up litter: “deep litter” that has accumulated through use for multiple flocks, usually with selective removal and addition of fresh litter on top of the old.

Bulk feed: feed transported loose, i.e., not in bags; usually unloaded by auger into large bins at the farm.

Bumblefoot: an infection of the footpad of a bird causing swelling and lameness; usually caused by a Staphylococcus infection.

Bursa of Fabricus: a dorsal diverticulum of the cloaca that provides the site for early embryonic and chick ontogeny and the expansion of B-lymphocytes.

Byproduct: a co-product or secondary product.

Cackle: the sounds (including cak, cak, cak) characteristically made by a hen following the laying of an egg.

Cage: a relatively small enclosure, usually made of wire, in which birds are maintained for growth or egg laying. The birds are not in contact with the ground or their feces.

Cage house: a house in which birds are maintained in cages without access to the ground and most of which have automatic feeders, waterers, and egg collection.

Cage layer fatigue: a weakness or paralysis in laying hens kept in cages caused by calcium and phosphorus imbalances in a period of high egg production, with phosphorus being most important. Other factors may also be involved.

Calamus: the quill of a feather.

Calciferol: vitamin D₂; less potent than D₃ in poultry.

Calcium: a major mineral constituent of the diet that is required for bone deposition, shell formation and numerous other functions.

Calorie: the quantity of heat required to raise the temperature of 1 gram of water 1°C. Calorie level in the diet is commonly expressed as kilocalories per pound, kilocalories per kilogram and megajoules per kilogram of feed. One calorie = 4.185 joules.

Calorimeter: an instrument for measuring the amount of heat liberated or absorbed.

Candidiasis: fungal infection of the mouth, esophagus and crop commonly caused by *Candida albicans*, a fungus. See Thrush.

Candle or candling: examination of intact eggs with a light to determine internal conditions of incubated eggs (presence of an embryo, developmental stage of the embryo, presence of contamination, etc.). Table eggs are also candled to detect and remove eggs with cracks, blood spots, and other blemishes. Candling may be done with a hand-held light source (candler) or automatically by machines.

Canker: infected spots in mouth and throat, often with exudate. Common in the wet form of fowl pox.

Cannibalism: behavior pattern that includes pecking of pen-mates, especially around the tail or vent, and resulting in various degrees of injury or in death. Causes are often due to nutritional imbalances and management problems. The use of beak trimming, low light intensity, “spectacles”, and medicated salves in isolated cases, may alleviate the problem.

Cape: short feathers underneath the hackle at the juncture of the neck and back.

Capillary worms: small, slender, hair-like worms that infest various parts of the intestinal tract of the bird, especially the crop. They may occasionally enter the trachea. They do not require an intermediate host. Heavy infestation may result in loss of weight, hemorrhage and death.

Capon: a young male chicken with testes removed with the intention to cause the bird to have more desirable meat. With current genetic stocks, nutrition and management there is little if any advantage to the use of capons. Plumage patterns and color resemble those of the male. Compare Poulard.

Caponization: the surgical procedure for removing testes of young male chickens.

Carcass: all edible parts of a slaughtered animal, including edible viscera.

Cardiac: related to the heart.

Carnivorous: eating mostly animal matter, including insects.

Carotenoid/Carotene: yellow and red pigments found in many plants and in some animal tissues. Some, such as beta-carotene can be converted into vitamin A in the body. They are the primary pigments responsible for the yellow color of egg yolks, fat, and skin.

Carotid artery: blood vessel carrying blood to the head and neck.

Carriage: posture of the bird.

Carriers: animals that can be the source of disease organisms even though they show no symptoms of the disease.

Caruncles: an outgrowth or protuberance of the skin on the head and neck of turkeys and Muscovy ducks.

Case: a container used in commercial practice for packaging eggs. The standard sized case will hold 30 dozen (360) eggs.

Casein: a phosphoprotein obtained from cow's milk that is the basis for cheese and can be used as a feed ingredient.

Caseous: like cheese. **Type of exudate** seen in some infections.

Cassava: an ingredient used as a dietary energy source in some geographical areas. It is produced from roots of a tropical plant having a high starch content. Also known as manioc and tapioca.

Castration: removal of testicles or ovary resulting in capon or poulard, respectively. Reproductive organs may also be rendered nonfunctional by chemicals.

Catabolism: a process in which animal tissue is broken down into simpler compounds or waste products.

Catalyst: a substance that changes the rate of a chemical reaction without being changed itself.

Cation: a positively charged ion.

Cecal tonsils: lymphoid tissue at the base of the ceca at the illeocecal junction.

Cecal worms: *Heterakis gallinae* is a small roundworm that is found in the ceca. It is often a carrier of Blackhead. See *Heterakis* and Blackhead.

Cecum or ceca (plural): paired, closed, narrow pouches branching from the gut at the junction of the small and large intestine. Site of fermentation and digestion, especially of fiber. The contents are periodically evacuated and have a characteristic odor and smooth consistency. Blind gut.

Cell-mediated immunity: immunity that depends on T-cells produced by the thymus, which are sensitized by exposure to a specific antigen. See T-cells.

Cellulitis: inflammation of the cellular or connective tissue.

Cellulose: a fibrous, complex carbohydrate that is a main constituent of plant cell walls. Most poultry species digest cellulose poorly. Some digestion occurs in the ceca.

Central nervous system: neural tissue of the brain and spinal cord that coordinates the activities of the bird through connection with the other parts of the nervous system.

Cere: the enlarged, unfeathered, waxy, fleshy area around or above the nostrils of birds such as pigeons, budgerigars and waterfowl.

Cereals: seeds of plants used for food and feed. Common cereals are corn, wheat, rice, sorghum, oats and barley.

Cerebellum: section of the brain behind the cerebrum that is involved in coordinating muscle movement.

Cerebrum: prominent forebrain that consists of two lobes responsible for voluntary actions, communication and thought processes.

Cervical: pertaining to the neck.

Cestodes: commonly known as tapeworms. Segmented worms found in the intestinal tract. Usually have intermediate hosts such as beetles, worms, and larvae.

Chalaza: twisted strands of thick albumen that immediately surround the egg yolk forming the chalaziferous layer, attaching the yolk to the albumen and keeping it oriented and centered in the egg during egg storage and early incubation.

Chalaziferous layer: see Chalaza.

Challenge: to expose birds to an antigen.

Check: an egg that has a broken shell or crack in the shell but has its shell membrane intact and the egg contents are not leaking.

Cheep: sounds of young chicks.

Chemesthesis: a sense based on chemically induced pain.

Chemical senses: there are three classes of senses with a chemical basis: gustation or taste, olfaction or smell, and chemesthesis or chemically induced pain.

Chemotherapy: use of substances, such as antibiotics, that inhibit or destroy disease organisms with less damage to body tissue.

Chick: the young of chickens, pheasants, quail and other birds.

Chicken: the domestic fowl, *Gallus domesticus*, used for meat, eggs, feathers and showing. There are several hundred recognized breeds of various sizes, only a few of which are important for meat and eggs. There are four known species of wild chickens: Red Junglefowl (*Gallus gallus* or *G. bankiva*), Grey Junglefowl (*Gallus sonnerati*), Ceylon Junglefowl (*Gallus lafayettei*), and Green Junglefowl (*Gallus varius*). The Red Junglefowl has more in common with the domestic chicken than do the other types.

Chick guard: a circular fence about 18 inches high placed around a brooder to keep young chicks near the heat and to eliminate corners.

Chick-go-round: a rotary table(s) used in servicing (sexing, vaccination, etc.) newly hatched chicks.

Chilling tank: a large container in which processed birds are cooled in ice water prior to packaging.

Chill Pack: a form of refrigeration in which processed raw poultry products are chilled to 26 to 32°F (-3.3 to 0.0°C) degrees and packed in containers without being covered with ice.

Chlamydiosis: disease caused by *Chlamydia psittaci* called ornithosis in turkeys and psittacosis in psittacine birds, and can cause influenza-like disease in humans.

Chlorination: the application of chlorine to water, sewage, or industrial wastes, generally for the purpose of disinfection.

Choice feeding: supply more than one type of feedstuff at the same time so that the bird may choose which type of feed to consume.

Cholecalciferol: vitamin D₃, the most active form in the bird.

Cholera: see Fowl cholera.

Cholesterol: a crystalline, fatty alcohol found in animal tissue and products such as eggs. It may serve as a precursor for vitamin D₃.

Choline: a vitamin of the B complex group required by the bird for normal growth.

Chorioallantois: embryonic membrane formed from the fusion of chorion and allantois membranes. It grows around the inner surface of the inner eggshell membrane. Primary functions include embryonic respiration, absorption of albumen, absorption of shell minerals and protein, embryonic waste repository, and regulation of water loss.

Chorion: embryonic membrane that grows toward the shell and fuses with the allantois to form the chorioallantois by about the end of the first quartile of incubation. See Chorioallantois.

Chondrodystrophy: embryonic abnormality that includes shortened and bent bones in legs and wings, general dwarfism, parrot-like upper beak, and internal organ malformations. Caused by nutritional deficiencies or heredity.

Chromosomes: paired, rod-like structures in a cell nucleus that contain the genes.

Chronic: an acute disease condition that becomes extended for several days or weeks is then considered to be chronic.

Chronic Respiratory Disease (CRD): a respiratory system disease caused by pleuropneumonia-like organisms. It may occur in many different species of birds, at various ages, and may persist for various periods of time in a flock. Mortality may be quite variable.

Chukar: an Asian partridge (*Alectoris graeca*) that is grown domestically and used by some hunting preserves as a game bird.

Circadian: rhythms that approximate 24 hours. Physiological functions that recur in a pattern throughout a 24-hour period, for example, body temperature, hormone levels, blood component levels, etc.

Circannual: rhythms that approximate 1 year.

Circulatory system: heart and blood vessels (arteries and veins) that circulates blood to all parts of the body. It carries oxygen and nutrients to tissues and wastes away from tissues; it also carries endocrine products and is involved in heat removal and conservation.

Classification: grouping of breeds according to their “class” or origin as defined in the American Standard of Perfection.

Clavicle: “wishbone”; the V-shaped bone in the breast.

Clean legged: having no feathers on the shanks or feet. Compare with Feather Legged and Booted.

Clears: candling rejects; infertile or early dead hatching eggs identified by candling.

Climatic chamber: a room or cabinet with controlled environmental conditions, such as temperature, humidity, light, and air flow, that is generally used for experimental purposes.

Cloaca: the combined external opening for the digestive, urinary and reproductive systems. There are three areas of the cloaca: the coprodeum or anterior area in which the digestive system empties; the urodeum or middle area in which the ureters of the urinary system enter dorsally and the vas deferens of the male or the oviduct of the female enter laterally; and the proctodeum, which is the external opening (vent) of the cloaca.

Closed flock: a flock or group of birds bred from generation to generation without the introduction of new gene sources.

Close feathered: feathers are held flat or close to the body.

Clot: a gelatinous clump of blood cells and other components resulting when blood is withdrawn from the circulatory system or escapes during trauma and the clot formation mechanism is initiated.

Cloudy white: albumen of an egg that has a light colored foggy appearance. It can be associated with CO₂ buildup in the egg.

Clubbed down: feathers with little or no growth out of the follicle and having a stubby appearance. A riboflavin deficiency in the egg is considered to be one cause of the condition in the embryo/chick.

Clutch: an egg or a group of eggs produced by the female before incubation begins; the eggs to produce a brood. A clutch may consist of one or more egg sequences. It is sometimes confused with egg sequence. See Egg Sequence and Brood.

Clutch interval: the time between clutches or broods.

Cobalamin: a group of chemically similar compounds containing cobalt in their structure and having anti-pernicious anemia activity. Vitamin B₁₂ is such a compound.

Coccidiosis: intestinal disease caused by various species of protozoa (coccidia). Some species are specific to certain portion of the intestinal tract and they may be specific to a bird species.

Coccidiostat: drugs that reduce the number of coccidia and the effects of coccidiosis.

Coccygeal: terminal vertebra or tail.

Cock: a male chicken or fowl more than one year old. Sometimes applied to males from the time of full sexual maturity. **Also called Rooster.**

Cockatrice: a mythical creature or serpent hatched by a reptile from a cock's egg.

Cockerel: a male chicken or fowl less than one year old. Sometimes applied to males up to full sexual maturity.

Coddled egg: egg broken out and cooked in water that is lower than boiling.

Coefficient of inbreeding: the mathematical expression of the degree of inbreeding present in an individual or group of birds.

Colibacillosis: a clinical infection caused by *Escherichia coli*. May cause enteritis, colisepticemia, airsacculitis, infection of the oviduct, peritonitis, perihepatitis, pericarditis, coli-granuloma and omphalitis.

Columbian: a plumage pattern in chickens consisting of white except black in the neck, primary wing, and tail feathers.

Columella: the single bone in the ear of a bird.

Comb: a fleshy protuberance on the top of the head of chickens and some other species. It is a secondary sexual characteristic, being much larger and more colorful in males. The types include: single, rose, pea, buttercup, cushion, strawberry, v-shaped, and Silkie.

Comfort zone: range of environmental conditions such as temperature, humidity and air flow, in which an animal appears to have physical and mental well-being. See also Thermoneutral zone.

Commodity packed: whole or fresh young ready-to-cook poultry which have little or no values added and are generally prepared for retail and consumer markets.

Competitive exclusion: epithelial associated or bound microorganisms that prevent contact between the epithelial cells and pathogenic bacteria. In the control or prevention of disease, it is normally associated with populating the gut with desirable, nonpathogenic organisms and thus blocking or 'excluding' the population of more pathogenic organisms.

Complementary genes: two or more independent genes that must be present to produce a specific effect.

Complete feed: nutritionally balanced feed mixed for specific animals and ready to be consumed

Composting: a natural decomposition process for organic wastes

Concentrates: dietary mixtures containing high protein, minerals and vitamins that are combined with cereals or other ingredients to provide a balanced feed.

Condensed fish solubles: a by-product of fish meal production that is a good source of some vitamins but may be low in some amino acids.

Conformation: body shape, structure, fullness.

Conduction: heat transfer by direct contact of the body with an object or substance.

Congenital: condition existing at or before hatch or birth. May imply an inherited condition.

Contagious: a disease capable of being transmitted to a new host.

Contour feathers: those with a stiff vane or web; a small down portion may be present in the anterior part of the web.

Contract growing: a common form of broiler production in which the producer furnishes buildings, equipment, utilities and labor and the contractor (usually a processing complex) furnishes chicks, feed, medications, harvesting, and consultations. Payment is usually by a formula agreed upon in the contract. Similar arrangements are made for pullet production, hatching egg producers and table egg producers.

Controlled environment housing: a poultry house equipped with temperature, light and air quality control.

Convection: the transfer of heat from a warmer to a cooler surface by using the air between the surfaces, usually the upward movement of warm air.

Conversion: see Feed conversion.

Coop: house, pen or cage in which a bird is placed for transportation or to live.

Coprodeum: see Cloaca.

Copulation: sexual union or intercourse of male and female.

Corn: in the western hemispheres corn refers to maize, whereas elsewhere it may refer to whole cereal grains including maize, wheat, oats, etc. It is a primary ingredient in most poultry diets. Although it contains approximately 9% protein, it is generally considered the primary source of energy in the diet. See Maize.

Corn belt: the area of the U.S. where corn is a principal crop including Iowa, Indiana, Illinois, Kansas, Kentucky, Missouri, Nebraska, South Dakota, Minnesota, Ohio, and Wisconsin.

Corn germ meal: the germ of the corn kernel remaining as a byproduct from the manufacture of corn starch.

Corn gluten: the outer covering of the corn kernel remaining as a residue from the manufacture of corn starch. It does not include the germ.

Cornish: a breed of the English Class of chickens having large skeleton and heavy breast muscles. They are used as the base male stock for commercial meat type chickens.

Cornish Game Hen: a meat type chicken having at least 25% Cornish blood that is processed at a young age and small body weight as a specialty product. Similar to Poussin.

Corn-soya diet: a diet with maize and soybean meals as the major ingredients.

Corpus luteum: the post-ovulatory follicle of the ovary. It may have a function in oviposition, however, it has little in common with the mammalian corpus luteum in regard to function.

Coryza: an upper respiratory infection especially affecting the nasal passages, sinuses and eyes. Caused by the organism *Hemophilus gallinarum*.

Coturnix quail or Japanese quail: a small asian ground-dwelling bird (*Coturnix coturnix japonica*) that has been bred and used commercially for meat and egg production. In nature they are migratory. The breast meat is dark.

Coverts: feathers that cover the base of primary wing, secondary wing, and main tail feathers.

Covey: a flock of quail.

Cracks: eggs with breaks in the shell.

Cramming: a system of individually force-feeding birds to produce fattened table birds or livers for pate de foie gras. See Noodling.

Crazy chick disease: see Encephalomalacia.

Creeper fowl: an inherited condition (heterozygote) in which the bird has shortened leg bones. The homozygous dominant condition is lethal.

Crest: a rounded tuft of feathers on the top of a bird's head; it is usually more fully expressed in birds having a knob or round bony structure on the head.

Crop: the enlarged portion of the esophagus located at the base of the neck and outside of the body cavity. The primary function is food storage.

Crop bound: a condition in which the crop is filled with material (impacted) that is not moved on through the digestive system.

Crop, pendulous: a crop extended with material and hanging in front of the bird's breast. It is more common in turkeys.

Crop, sour: the material in the crop is not evacuated and becomes fermented with a sour or foul odor.

Crossed beak: an abnormal condition in which the upper beak (maxilla) is curled to one side and misaligned with the lower beak (mandible).

Crosses, crossbreds: progeny resulting from the mating of two varieties, breeds, or genetic stocks.

Crow head: a narrow, shallow head and beak.

Crude protein: calculation of the protein content of a feed or feed ingredient based on analysis for nitrogen. The amount of nitrogen is multiplied by 6.25 (on average, proteins contain 16% nitrogen).

Crude fiber: that portion of a feed or feed ingredient that remains insoluble (primarily cellulose) after treatment with hot sulfuric acid and then hot potassium hydroxide, minus the ash.

Crumbles: feed with particle size intermediate between mash and pellets. Usually pelleted feed that has been partially broken. See Pellets.

Cryptomere: a genetic character that is not expressed because of masking by another gene.

Cull: an unthrifty or unproductive bird; not up to standard; usually removed (or culled) from the flock.

Curled toes: a condition in chicks that is characteristic of a riboflavin deficiency.

Cushion: a large mass of feathers over the back and base of the tail in some breeds resulting in a rounded appearance.

Custom hatching: hiring another hatchery to do incubation and chick services.

Cuticle: the outer layer of the eggshell, primarily protein; its function is to partially seal the shell to prevent bacterial invasion and excessive water loss. See Bloom.

Cyanogenetic glucoside: a toxin found in linseed meal.

Cyanosis: bluish color of the skin usually associated with low levels of oxygen in the blood caused by poor ventilation and gas exchange.

Cycloopia: an embryonic abnormality characterized by the presence of one, median, eye and usually associated with other head abnormalities.

Cygnets: young swan.

Cyst: a closed, abnormal sac in the body usually filled with fluid or semi-solid substance that is caused by abnormal development, disease or parasite.

Cytology: branch of biology dealing with cells, their structure, morphology, physiology, pathology, etc.

Dam: the mother or hen.

Dam family: siblings that have the same dam or mother.

Dander: small particles of dead skin and feather particles.

Dawn: the dark/light interface that the bird senses as the beginning of the light period.

Daylength: the period of time between dark/light interface and light/dark interface that the birds senses as the day or light period. May also refer to the 24-h day in contrast to ahemeral day.

Day-old: short, industry jargon for one-day-old chick or poult

DDGS: see Distillers dried grains with solubles.

Dead-in-shell: embryo that died during incubation without exiting the shell.

Debeak: a term sometimes used for beak trimming.

Debone: removal of the muscles and soft tissues from the bones during processing of the carcass. Also called boning.

Deep litter: also called “built-up litter”; poultry house litter that is allowed to remain in the house for extended periods of time with periodic removal of wet areas and addition of some fresh litter. It can be managed so that it composts in place and is relatively free of pathogenic organisms. See Litter.

Degree-day: difference above and below the freezing temperature (32°F); thus a daily mean temperature of 68°F = 36 degree days for that day.

Dehydration: loss of water; body has a water deficit.

DELMARVA: the peninsula of land in the U.S. where Delaware, Maryland and Virginia converge. This area is situated between the Atlantic Ocean and the Chesapeake Bay, which is also referred to as the Eastern Shore. This area has historically supported a large volume of commercial broiler production.

Denester: equipment that separates stacked boxes or packaging materials.

Depletion: process of emptying or loss of fluid or substance.

Depluming mite: *Cnemidoptes Gallinae*; a small mite that is found in the skin at the base of feathers. The irritation causes the bird to peck or scratch the feathers, damaging or pulling them out.

Depopulation: removal of all animals from a premise.

Dermatitis: inflammation of the skin.

Dermestes maculatus: a beetle that bores into wood and sometimes is found in poultry houses.

Dermis: layer of skin underneath the epidermis or outer layer.

Designer eggs: eggs produced to contain higher levels of certain constituents, such as omega-3 fatty acids.

De-spur: to remove the spur.

Determinate layer: birds that do not vary the number of eggs per clutch; eggs lost or broken are not replaced. Most of this type lay small clutches of 3 eggs or less, e.g., pigeons with 2 eggs and petrels with one egg. See Indeterminate layer.

Developer diet: the diet fed to growing pullets for several weeks prior to the time of the beginning of lay (sexual maturity).

Dewlap: a drooping growth of skin under the beak or bill and extending down the throat. Found in turkeys and some geese and chickens.

Diapause: the period of the embryo's life from the time the egg is laid until placed in an incubator or the hen begins incubation. A time of little or no development.

Diet: food in the form of nutrient components or ingredients provided in very specific amounts and proportions. Sometimes called a Ration.

Differentiation: change from a relatively generalized to a more specialized tissue during development; an increase in complexity and organization and in specialization of function.

Digestible energy: total energy of a feed less the energy remaining in the feces.

Digestive tract: see Intestinal tract.

Digit: a toe of the foot or "finger" of the wing; a phalange.

Dimorphic: males and females of a species have visible differences in plumage, usually in shape and color, and in size with males being larger in most domestic species.

Direct-fed microbials (DFM): cultures of viable microbes (e.g., *Lactobaccillus*, *Pediococcus* and *Bifidobacterium*) that, when fed, have a beneficial effect on the host by influencing intestinal microflora (e.g., by competitive exclusion), and enhancing immune response, nutrient absorption, control of pathogens, or other means. Also known as Probiotics.

Disease: a departure from the healthy condition that adversely affects the proper functioning of tissues, organs or systems. Causes include infectious agents, metabolic conditions, nutrition, genetics, environment and toxins.

Disinfect, Disinfectant: the use of a material (the disinfectant) to kill or inactivate harmful organisms.

Display: behavioral movements of birds during courtship prior to mating, for example, the male turkey fans the tail feathers and wings, engorges the caruncles and struts prior to mating.

Dissolved Air Flotation (DAF): method of removing oil and suspended solids

Distal: part located away from the main body.

Distended crop: an abnormally enlarged crop.

Distillers dried grains plus solubles (DDGS): the residual product from distilling grains to produce ethanol that can be used as a poultry feed ingredient.

Diurnal: during the day or light period.

Diurnal rhythm: see Circadian.

Domesticate: to cause animals to adjust to living under the control of man for food or other purposes.

Dominance, genetic: a character that suppresses its allele in the heterozygote individual. In incomplete dominance the allele is only partially suppressed.

Dominance, social: status of individuals within a flock; those with high status in the peck order.

Dorsal: the back, or toward the back or upper surface of the body.

Double-yolk: an egg having two yolks, usually the result of two ova being ovulated at the same time. It may also result from one ovum not being picked up by the infundibulum on the day of ovulation.

Down: 1) the fluffy feathering of newly hatched chicks. 2) A fluffy type of feather in adults that functions as insulation.

Drake: a male duck.

Drawdown of air cell: the change in shape and extent of the air cell that occurs just prior to the internal pipping of the membranes in the beginning of the hatching process.

Drawing: removal of intestines. See Processing.

Dress, dressing: related to preparation of the carcass for cooking. See Processing.

Drip loss: the loss in weight of a carcass following chilling in ice water, primarily due to the loss of water.

Droppings: the feces of birds; a partial white coating consists of urates; dark brown, smooth feces is usually of cecal origin; the remainder is from the large intestine.

Dropsy: see ascites.

Drumstick: that portion of the leg having the tibia and fibula bones; the distal half of the cooked leg.

Dry bulb temperature: ambient temperature measured without effect of humidity.

Dry matter: that portion of feedstuffs remaining after all moisture has been removed.

Dual-purpose breed: a breed that has relatively good egg production as well as moderate fleshing. The male chicks are usually grown out for meat purposes. They are often used for home flocks but are not economical for commercial purposes.

Dub, dubbing: removal of the comb, usually in very young chicks. Wattles may also be removed. Practiced to prevent injury in breeds with very large combs, especially single combs.

Duck: small to moderate sized fowl (waterfowl) with web feet of the Anatidae family that are used for meat, eggs and feathers. There are several domestic breeds and species as well as many wild species.

Duckling: young duck.

Duct: a tube or canal that carries fluid or secretions from a gland or organ.

Ductus deferens: see Vas deferens.

Duodenum: the first portion of the small intestine posterior to the gizzard, in a U-shaped loop with the pancreas attached in the loop.

Dusk: the light/dark interface that the bird senses as the end of the light period.

Dust, dust-bathe: birds make a depression in dry, dusty soil and stir up the dust to get it under the feathers and on the skin. A natural activity that is thought to discourage parasites.

Dwarf: a smaller than usual version of any type bird, which may be an abnormality or may be intentionally produced. Some are abnormalities in embryos, which are lethal.

Ear: the organ of hearing. Unlike mammals, there is only one bone (the columella) in the ear of the bird. Usually covered externally by small feathers.

Ear lobe: a fleshy area of bare skin below the ears in some species; may be white, red, blue or other color.

Earthnut: groundnut or peanut. Can be used as a feed ingredient.

Ectoparasite: a parasite that lives and feeds on the external surface of the host. Mites, lice and fleas are common poultry ectoparasites.

Ectopic viscera: a malformation in embryos in which the body cavity is open thereby exposing the internal organs.

Edema: fluid accumulation in cells, tissues or cavities of the body, resulting in swelling.

Effluent: the liquid that comes out of a water treatment facility after completion of any treatment process

Egg: the reproductive cell of the female bird. The major parts are yolk with germinal cell, albumen, membranes, and shell. All of the nutritional elements necessary for embryonic development are present in the egg. Only the blastoderm (germinal cell) is living tissue.

Egg bound: a complete egg that the bird was unable to lay causes subsequent eggs to accumulate in the oviduct, body cavity, or both.

Egg dipping: a procedure in which warm eggs are submersed in a cool liquid containing antibiotic, hormone, or other active substance that is drawn into the egg as it cools and contracts.

Egg Drop Syndrome: an adenovirus-caused disease in laying birds characterized by severe decreases in egg production accompanied by eggshell abnormalities.

Egg flat or tray: molded plastic or paper, commonly containing 30 cone-shaped molded cups, each holding one egg placed small end down. These are placed in cases or boxes for moving and storage. Many sizes and special designs are available for use in specific incubators as setter trays.

Egg residue: see Hatch residue.

Egg sequence: the eggs laid on consecutive days before skipping a day or more.
Contrast Clutch.

Egg shell: the hard calcareous coating of the egg that functions to provide physical protection, a barrier to microorganisms, gas exchange (oxygen, carbon dioxide and water vapor) for the embryo, and a source of nutrients (especially calcium) for the embryo. The shell is approximately 95% mineral of which 97 to 98% is calcium carbonate with small amounts of magnesium carbonate and tricalcium phosphate.

Egg shell waste: byproduct of egg-breaking operations.

Egg sizes: in the U.S. shell eggs are divided by size into classes according to weight. Minimum weights per dozen eggs are: Jumbo (30 oz), Extra Large (27 oz), Large (24 oz), Medium (21 oz) and Small (18 oz).

Egg tooth: a temporary pointed tip that develops on the upper beak of the embryo and which the embryo uses in breaking through the shell in the process of hatching. It is shed shortly after the chick hatches.

Egg turning: the practice during incubation of turning the egg around the long axis if incubated in a horizontal position or around the short axis if incubated with the large end up (as in most incubators). The common turning interval is once per hour at a 45° angle.

Egg yolk peritonitis: inflammation or infection of the peritoneal cavity caused by the presence of unabsorbed yolks that were not engulfed by the infundibulum.

Ejaculate: the semen, including sperm and fluids, that is discharged (ejaculated) by the male during Copulation.

Electrolyte: a solution, usually of a mineral, capable of carrying an electrical charge.

ELISA: enzyme linked immunosorbent assay.

Elutriation: a method of particle separation based on size or weight and movement in an air stream. Air washing or air classification.

Emaciated: the body is excessively lean and in poor condition as seen in nutritional deficiencies.

Embryo: in the bird it is the period of development in the egg from one cell to hatching. Some development may occur at 76°F (24.5°C) with normal development in the chicken at approximately 99.5°F (37.5°C). The ideal developmental temperature varies slightly due to age of the embryo, species and other environmental conditions.

Emu: a large flightless bird (*Dromiceius novae-hollandiae*) of Australian origin similar to the ostrich, but smaller, that is used some for meat production.

Encephalomalacia: neural degeneration due to a vitamin E deficiency. Also called Crazy Chick disease. Results in lack of muscle coordination.

Encephalomyelitis: also known as Epidemic Tremors. Affects the brain and nervous system and may result in ataxia, prostration and death. Caused by a virus infection.

Endemic: commonly present in a particular population or geographical location.

Endocrine glands: glands that produce internal secretion(s) that are carried **by the blood** to other tissues whose actions and functions they affect. Examples are thyroids, pituitary, adrenals, pancreas, gonads, and intestine.

Endogenous: originates or develops within the body.

Endoparasite: a parasite that lives and feeds in the internal tissues of the host. Roundworms and coccidia are examples.

Endotoxins: toxins produced by bacteria.

Energy: the caloric value of food; used for heat production, muscle activity, enzymatic activity, reproduction and other physiological functions. Total energy may be divided into metabolizable energy, productive energy, etc. See Metabolized energy.

Energy-protein ratio: the balance of energy and protein in the diet necessary to permit maximum efficiency of production of meat, eggs, or other products.

Enteritis: an inflammation of the intestine, especially of the small intestine. See Necrotic enteritis and Ulcerative enteritis.

Entrainment: the physiological change of an internal rhythm of the bird to synchronize it with an external phenomenon, such as a light cycle.

Environment: the conditions and influences surrounding a bird that affect it in some way. Broadly, nutrition and all other factors except genetics could be included, but in practice temperature, humidity, air flow, space, light, microbial population and pollutants are considered environment.

Enzyme: protein or protein-like substances that act as an organic catalyst to initiate or speed up physiological reactions, usually specific to that enzyme. Most become inactive in high temperatures.

Epidemic tremors: see Encephalomyelitis.

Epidermis: outer layer of skin.

Epigenetic: DNA changes that alter the way genes are turned on and off without altering genetic information.

Epinephrine: adrenaline, a hormone secreted by the medulla of the adrenal glands. Stimulates the heart, increases muscular strength and endurance, increases blood pressure, etc.

Epistasis: suppression of the normal expression of a gene by one or more other genes. For example, the inheritance of white in the White Leghorn breed results in the barring gene not being expressed. The gene suppressed is Hypostatic.

Epithelium: cellular tissue that forms the covering of the body surface, body cavity and hollow organs; includes several types of cells and occurs in one or more layers.

Epizootic: a disease epidemic in animals.

Ergonomics: the study of problems of workers adjusting to their environment and the science of adapting the working conditions to best suit the workers, especially anatomically.

Ergosterol: a substance found in ergot and yeast that, when exposed to sunlight, is transformed into vitamin D₂, which is not very active in poultry.

Ergot: toxic substances produced by certain fungi in grains, especially rye.

Erysipelas (Erysipelothrix Septicemia): a disease caused by a streptococcus that is more common in young turkeys (often characterized by an injured and swollen snood).

Erythrocyte: red blood cells or corpuscles. They contain hemoglobin and transport oxygen to tissues. Avian erythrocytes contain a nucleus whereas mammalian erythrocytes do not. One mL of blood will contain about 3 million erythrocytes.

Erythromycin: an antibiotic and growth promotant.

Esophagus: the tube connecting the mouth with the crop and proventriculus and through which food is moved by gravity and peristaltic action.

Essential oils: plant extracts such as clove and cinnamon that have some anti-microbial activity.

Estivate: induce torpidity by heat and dryness as opposed to hibernation in the cold.

Estrogen: hormone(s) secreted by the ovary and in small amounts by the adrenal. Affects blood lipids, calcium, and other constituents, influences the formation of egg components, and affects numerous physiological activities. It also refers to synthetic compounds with estrogenic properties.

Ether extract: weight loss (%) of a substance following extraction with ether. It gives an approximation of fats and oils in the sample, although other substances are also soluble in ether.

Etiology: the study of the cause and origin of diseases.

European Production Efficiency Factor (EPEF): a measure of the efficiency of broiler production.

Evaporative heat loss: the heat energy absorbed by water or other substance as it changes from a liquid or solid to vapor. Latent heat.

Eversion: partial expelling of the cloaca from the body. This is natural in laying of the egg but may abnormally remain outside of the body.

Evisceration: removal of organs from the body cavity during dressing and processing of a bird for meat purposes.

Excreta: waste matter excreted or eliminated from the body; feces and urine.

Excrete: to remove waste substances from the tissues and eliminate from the body.

Exhibition breed: breeds and varieties of poultry selected for the purpose of exhibiting in shows. They are judged on standards established by recognized organizations that included the breeders.

Exogenous: originating from outside the body.

Expeller process: extraction of oil from seeds such as soybeans using heat and pressure.

Exploder: eggs that explode during incubation, usually because of contamination.

Exsanguination: removal of blood from the body.

Extender: a vegetable protein product added to meat products. May also apply to materials added to vaccines to increase the number of vaccine doses, and semen to increase insemination doses.

Extension service: established in the U.S. in 1914 by the Smith-Leaver Act, it is a cooperative organization including federal, state, and county funding and personnel. The purpose is to teach and advise consumers, producers and others, provide publications, help solve practical problems, and to act as intermediary among industry, consumers, and research personnel.

External parasites: organisms such as fleas, lice, ticks and mites that live on the outside of the bird's body and feed on the bird. See Ectoparasite.

Extra-embryonic membranes: membranes that develop outside of the embryonic body; they are the amnion, chorion and allantois (chorioallantois), and yolk sack. Each of the membranes has one or more vital functions during the process of embryonic development.

Exudate: fluid or material that abnormally passes through vessel walls and accumulates in tissues. They sometimes have diagnostic value.

Exudative diathesis: edema in subcutaneous tissue caused by deficiencies of selenium or vitamins.

Eye: the organ(s) of vision. Birds are visually dependent and tend to have larger eyes relative to body size. The ostrich has the largest eye and focal length of any land animal.

Eyelids: the moveable folds of tissue that cover and uncover the eye, provide protection to the eye, and keep the eye moist. See Nictitating membrane.

Eye stripe: a dark marking in some birds, especially chicks, that surrounds the eyes and may go toward the back of the head. Sometimes considered to be a wild type of marking.

Family selection: genetic selection program based on performance of family as well as the individual. For example, a female would be selected for egg production on the basis of her own record and that of her full sisters and a male could also be selected on egg production based on the record of his full sisters.

Fan: a device for causing movement of air, as in a ventilation system. Effectiveness can be measured as air flow rate (e.g., cubic feet per minute).

Fancier: a breeder of exhibition type birds used for showing.

Fast food broiler: young chickens with live weights of 4.20 lb and lighter. Without giblets (WOG), these birds should weigh between 2.40 and 2.90 lb.

Fat deposits: birds tend to deposit fat around the internal organs, and especially in the abdominal body wall. Diets are formulated to minimize these economically wasteful deposits.

Fat soluble vitamin: vitamins soluble in fats and oils include A, D, E and K.

Fatty acids: any of several unsaturated or saturated monobasic organic acids that occur in the form of glycerol esters in fats and oils. Some are considered essential nutrients.

Fatty Liver syndrome: excessive lipid accumulation in the hepatocytes of the liver of laying hens causing the liver to be friable and easily ruptured.

Favus: infection of the skin, especially of the head and comb; caused by a fungus (*Achorion gallinae* or *Trichophyton schoenleini*).

Feather: outer covering of the bird's body; modified scales attached to the skin in follicles. Feathers are a unique anatomical feature of the bird. Under natural environmental conditions the bird will replace (molt and re-grow) most feathers one or more times a year. Laying hens are managed in later production stages by induced molting and rejuvenation of the reproductive system.

Feathering: usually implies the amount and quality of the feather covering of a bird.

Feather legged: having feathers on the outer side of the shanks and on some toes. See Booted.

Feather tracts: the areas of the skin from which feathers grow. See Pteryla.

Feces: excreted waste matter from the digestive tract. However, the term as commonly used includes the urine as well because the urine is not voided separately by the bird. See Droppings.

Fecundity: fertility; may refer to the number of eggs laid over a certain period of time, to the number of fertile eggs produced, or to the number of chicks produced.

Feed: "to feed" is to provide food for the bird. However, it is just as commonly used to mean the food provided. Also referred to as diet or ration.

Feed conversion ratio (FCR): the amount of feed required to produce a unit of body weight increase, a unit of weight of eggs, or a dozen of eggs. (Example: 1.85 g feed per 1 g increase body weight). See Feed efficiency.

Feed efficiency (FE): the amount of body weight increase, eggs weight produced, or dozen of eggs produced by a unit of feed. (Example: 0.54 g increase body weight per 1 g of feed, which is the same as 1.85 feed conversion ratio). See Feed conversion **ratio**.

Feeder: equipment that supplies feed to birds; operation may be manual, semi-automatic or automatic, including weighing and portioning of the feed.

Feed formula: the listing of ingredients and the percent or weight of each in a mixed feed or diet.

Feed hopper: a semi-automatic feeder in which feed is stored in a hopper or reservoir and flows by gravity into the feed trough.

Feeding trial: a comparison of experimental groups fed different diets.

Female reproductive system: consists of the ovary, oviduct and cloaca. In most domestic birds, only the left ovary and oviduct are functional.

Femur: thigh bone; leg bone that articulates with the hip bone on the proximal end and knee on the distal end.

Feral: wild or untamed. Often applied to birds that once were in domestic flocks but are now free-living in the wild.

Fertility or fertile eggs: the proportion of eggs in which fertilization has occurred. Usually expressed as a percentage of eggs set.

Fertilization: the joining of male and female gametes, i.e., sperm and ovum, to form a zygote or new individual.

Fever: an abnormal increase in body temperature due to disease. Compare Hyperthermia.

Fiber: see Crude fiber.

Fibula: the minor bone of the lower leg (drumstick) which is fused with the longer and larger tibia.

Filoplumes: a thin, hair-like feather without a vane.

Finish: amount of fat under the skin of a meat bird.

Finisher diet: the diet used at the end of the production period for broilers.

First filial generation (F₁): progeny from mating poultry of two genetic types.

Fish meal: fish or fish parts processed into a dry meal product used as a feed ingredient as a source of protein, fat, minerals and vitamins.

Fish solubles: see Condensed fish solubles.

Fistula: a tube, pipe or other artificial opening inserted into the body for experimental or surgical purposes.

Flats (egg): trays with depressions or pockets in which eggs are placed for holding, transport, incubation or marketing.

Fleas: see External parasites

Fledge: having grown and developed enough to leave the nest and fly.

Fledgling: a young bird that has just fledged or left the nest.

Flight: a flock or group of birds flying together.

Flight feathers (pennines): feathers on the wings known as primaries and secondaries. Primaries are long feathers on the distal part of the wing, usually 10 in number, having a rigid quill and relatively smooth, flat surface; used in flight but otherwise folded close to the body. Secondaries are on the proximal part of the wing, and are usually shorter than primaries. These feathers have a strong shaft and broad vane or web.

Flighty: birds that are excitable and tend to fly when only slightly disturbed.

Flocculation: the coming together of coalescing and minute particles in a liquid

Flock: a group of birds that feed or move together. In domestication they will normally be of the same type and age, housed together, and managed the same.

Flock mating: mating of a flock of females with males placed in the pen at a ratio of approximately 1 male: 10 females, depending on breed, age, etc.

Floor eggs: eggs laid on the floor rather than in nest boxes of floor-type laying or breeder houses.

Floor house: cage-free house with litter floor in which manure accumulates in the litter.

Floor layers: hens that lay eggs on the floor. More broadly, hens kept in a house with a large floor area available to them.

Floor space: the amount of space on the floor allotted for each bird.

Flukes: parasitic flatworms that attack poultry, either internally or externally. Snails are usually an intermediate host. See Trematode.

Foggers: a system using nozzles where water is forced through an extremely small opening at a high rate of speed or pressure (from 300 to > 1000 psi) to create a fine mist.

Such systems are used in hatcheries to increase humidity and in both hatcheries and poultry houses for cooling.

Fold unit, folding system: a system of housing poultry using a small pen with attached wire mesh enclosure. Moved daily or periodically to fresh pasture or other space.

Folic acid: a water-soluble vitamin essential for the bird. Deficiencies cause poor growth, perosis, anemia and reduced hatchability.

Follicle: vascular membrane surrounding an ovum in the ovary. Involved in ovum formation and hormone production.

Fomite: a person, animal or physical entity that transports an infective agent from one location to another.

Footcandle: See Lumen and Lux.

Foot force: pressure on the floor generated by steps of a walking bird; its measurement provides an evaluation of foot and leg health.

Foramen: an opening, often through bone, through which nerves, blood vessels, etc. may pass.

Forced-draft incubator: an incubator in which the air is circulated by a fan. See Incubator.

Forced molt: the partial or whole molting of feathers intentionally induced by changes in environment, diet or other means. The physiological process also includes the rejuvenation of the reproductive system to partially restore egg production rate and egg quality thus extending the productive life of the hen.

Formaldehyde: see Formalin.

Formalin: a chemical used to produce formaldehyde gas that has been used in fumigating eggs and equipment in hatcheries.

Fowl: 1) domestic birds used for food and other economic purposes, including chickens, turkeys, ducks, geese, guinea, quails, pheasants, pigeons, etc. 2) Stewing hen. See Poultry.

Fowl cholera: an infectious poultry disease caused by the bacteria *Pasteurella multocida*. Mortality can be very high.

Fowl paralysis: a virus disease affecting the legs and wings until the bird eventually cannot stand. Involves the enlargement and derangement of various nerves. See Marek's disease. Controlled to a large extent by vaccination.

Fowl pox: a viral infection causing lesions with scabs on the comb, wattles and around the eyes and face. A “wet” form also causes lesions in the mouth and throat. Primarily controlled by vaccination and sanitation.

Fowl typhoid: a disease caused by the bacteria *Salmonella gallinarum*. Similar to pullorum but more common in adult birds.

Frass: refers to mites in feathers.

Free-choice feeding: providing feed ingredients in separate feeders and allowing the birds to select the amount of each they may eat. Commercially, it might involve 2 feeders with one containing ground cereal, the other a high protein source, with vitamin and mineral supplements mixed with one of the ingredients.

Free Range Management: non-confinement production alternative allowing birds to forage freely (loosely defined by USDA guidelines).

Friable: fragile or easy to rupture.

Frizzle: a feather that is curved out from the body. A characteristic of the Frizzle breed of chickens.

Fronts (Front quarters): the front half of a ready-to-cook young chicken consisting of the whole breast, both wings and back portion. This item is generally further processed.

Frugivorous: fruit eating

Fryer: a young meat-type bird that can be cooked in a variety of ways, including frying. See Broiler.

Fully furnished: a term used by fanciers to indicate a mature bird with complete adult plumage.

Fumigation: the use of formaldehyde or similarly effective gas to disinfect houses, rooms, equipment, incubators, eggs, etc. Some of the products used are health hazards.

Fungus, Fungi (plural): a large group of plant-like organisms that includes molds, yeasts, mushrooms, mildews, rusts, and smuts, many of which produce toxins. Responsible for many disease conditions in birds.

Further processing: preparation of the carcass beyond the normal processing point of cutting the dressed carcass into portions.

Gaggle: a flock of geese.

Gait score: evaluation of a bird's ability to walk.

Gall bladder: a membranous sac attached to the liver that acts as a reservoir for bile produced by the liver.

Gallinaceous: birds in the order Galliformes that nest on the ground and which include domestic chickens, jungle fowl, pheasants, grouse and others.

Gallus: the genus of chickens and jungle fowl. Refers to comb.

GALT: gut-associated lymphoid tissue. See Microbial mediated immunodevelopment.

Game birds: birds such as quail, pheasant, chukar, mallard ducks and wild turkeys that are utilized for meat and for hunting. Most are currently grown domestically for release on hunting preserves or for meat.

Gamete: a reproductive cell, either sperm or ovum, prior to fertilization. It is haploid, having half the number of chromosomes of autosomal cells.

Gander: a male goose.

Gangrene: dead tissue in an animal, usually because of poor blood supply.

Gapeworms: very small roundworms that infest the trachea. Male and female worms are permanently attached. Intermediate hosts include earthworms and snails but are not necessary for infection.

Gastrulation: a stage of early embryonic development in which cells migrate to begin forming specific layers of cells.

Gateway cages: a colony cage system designed to give birds more freedom of movement than in conventional cages.

Gene: units occurring at specific points on chromosomes by which inherited characters are transmitted to progeny and which function as determinants of physiological processes. Some may act as on-off switches for other genes.

General purpose breed: a breed of chicken that has good egg production and which is large enough with sufficient fleshing to also provide meat, especially the surplus cockerels. They are not efficient enough for commercial stock but are often used in home flocks.

Genetics: the area of biological science that deals with heredity and variation in organisms and, when applied, is used to change characteristics of the organism.

Genetic drift: performance characteristics such as egg production or growth rate tend to change from an established level in the absence of intentional selection.

Genital eminence: a small bump on the inner ventral wall of the cloaca that differs slightly between male and female newly hatched chicks and which is used by sexors to differentiate sex of the chicks.

Genotype: the characteristics of an individual determined by genetic components.

Genus: a classification of animals or plants having common distinguishing characteristics; a subdivision of a family and may consist of one or more species.

Germ: 1) the living cell (embryo) of the germinal disc (blastoderm) on the surface of the egg yolk. 2) It may also refer to bacteria or to the reproductive center of a plant seed.

Germicide: a substance capable of killing disease causing organisms. See Disinfectant.

Germinal disc: the reproductive cell on the surface of the egg yolk underneath the vitelline membrane. The blastodisc, or unfertilized ovum, is a dense white spot whereas the blastoderm, or fertilized ovum, is a white ring at the time of oviposition.

Giblets: organs and other parts considered edible including heart, liver, gizzard and neck.

Gizzard: the muscular stomach, posterior to the proventriculus, the function of which is to grind food. Under natural conditions it will contain small stones, picked up by the bird, that aid in the grinding process. Also Ventriculus.

Gizzard erosion: the internal wall lining of the gizzard may show hemorrhages and partial loss of the lining due to fungal toxins or nutritional problems.

Gland: an organ or group of cells that produce a substance that is used by the body, influences the body or a part of the body, or is excreted from the body.

Glandular stomach: the proventriculus or thick walled organ anterior to the gizzard and posterior to the esophagus that secretes digestive acids. See Proventricullus.

Glottis: a slit-like opening into the larynx from the oral cavity that is open for breathing and closed for swallowing.

Gluten: see Corn Gluten.

Gobble: the characteristic sound made by a male turkey.

Goiter: enlarged thyroid glands, usually due to a deficiency of dietary iodine.

Golf ball yolks: egg yolks that have a consistency similar to soft clay. These usually result from dietary ingredients containing fatty acids that, when transferred to the yolk, cause the yolk lipids to solidify when the egg is cooled. One example is certain fatty acids found in cottonseed meal.

Gonads: the reproductive organs, ovary in females and testes in males, that produce gametes and hormones.

Gonadotropic hormones: hormones (follicle stimulating hormone, or FSH, and luteinizing hormone, or LH) produced in the pituitary gland that control processes in the gonads.

Goose: 1) long-necked, web-footed, large fowl (waterfowl) of the Anser genus, subfamily Anserinae. There are several domestic breeds and species as well as several wild species. 2) It is also the female of the species.

Gosling: young goose.

Gossypol: a toxic substance found in unprocessed cottonseed meal that will cause olive green yolks, pink albumen, and decreased hatchability. Heating and oil extraction reduce or destroys gossypol.

Gout: swelling in feet or joints resulting from excess uric acid in the blood.

Gradeable Nest Runs (GNR): eggs from a production facility that have had some “checks” or “dirties” and other obvious undergrades removed and are suitable for grading.

Graded Loose: shell eggs that have been washed, sized, and candled for quality and packed in trays, flats or non-carton containers.

Grading: eggs and meat bird carcasses are often evaluated and assigned scores or grades that reflect quality of the product.

Grain: seeds of cereals that are edible for humans and/or animals. Usually ground to various sized particles for mixing in feeds.

Green or blue egg shells: a greenish color in the egg shell resulting from the presence of the gene for oocyan. This gene occurs in the Araucana breed but may be introduced into any other breed.

Green food: fresh, green plant material used for feedstuff; does not include root feedstuffs.

Green gosling: a young goose commonly used in celebration of Michaelmas (English).

Greenhouse gases: the major gases from poultry production systems contributing to the global greenhouse effect (CH₄, N₂O, and CO₂).

Green rot: spoiled eggs caused by contamination.

Green yolks: may be caused by dietary gossypol or by contamination.

Grit: small pieces of stone used by the bird to assist in grinding feedstuffs in the gizzard. Insoluble grit is usually granite or other hard stone. Soluble grit is usually limestone or oyster shell, which may be digested and absorbed as a source of calcium for bone or shell formation. Commercial production systems rarely feed grit.

Gross energy: see Energy.

Groundnuts: peanuts or earthnuts. The meal can be used as an ingredient and protein source for poultry feeds.

Grower or growing birds: birds in the age range between brooding and sexual maturity.

Grower diet: the diet given to growing birds, usually following the starter diet. There may be multiple grower diets that vary in formulation based on differences in nutrient requirements due to age and other factors.

Growth promoter: a feed additive that enhances growth, feed efficiency, or both.

Guinea or guineafowl: a domestic fowl (*Numida meleagris*) that is native of Africa and used for meat and eggs.

Gular flutter: fluttering of the throat area to cause movement of air and evaporative cooling without hypocapnia and alkalosis that can result from panting.

Gullet: see Esophagus.

Gynandromorph: an individual that has both male and female characteristics and contains cells that are genetically male (ZZ) and others that are genetically female (ZW).
See also Hermaphrodite.

Habituation: reduction or loss of response as a result of repeated stimulation.

Hackles: pointed, narrow feathers on the side and back of the neck. These feathers are more rounded in the female.

Hairline crack: very small egg shell cracks not normally visible.

Hammer mill: machine for chopping grains into small particles.

Handle: “to handle” is the examination of body characteristics of a bird (handling quality) such as spread of the pubic bones, width of back, depth of body in the visual assessment of the bird’s condition, reproductive potential, etc.

Harderian gland: a small gland located ventral and posteromedial to the eyeball that has a role in the immune system.

Hatch: 1) the emergence of young from an egg; 2) young that have emerged from the same group of eggs.

Hatchability: 1) of eggs set = the percentage of total eggs of a set that hatch; 2) of fertile eggs = the percentage of fertile eggs of a set that hatch. It may be further defined by counting only the saleable or useable chicks.

(As-)Hatched: newly hatched chicks that have not been separated according to gender; see Straight-run.

Hatcher: type of incubator in which eggs are placed in trays or baskets during the last few days (about 72 hours) of incubation to accommodate the hatching process. Small incubators may have a separate compartment for hatching.

Hatchery: a place where chicks or other young fowl are hatched. Modern hatcheries usually include areas for egg traying, egg storage, egg warming, setter incubators, hatcher incubators, chick processing (removal from trays, vaccination, sexing, counting, boxing, loading for transport), and cleaning. A high standard of sanitation is essential.

Hatch position: embryonic position within the egg just before the hatching process begins. In most birds the long axis of the embryo matches the long axis of the egg, the head is in the large end of the egg and bent forward and back toward the body to tuck the beak under the right wing, and the beak is pointed toward the air cell. See Malposition.

Hatch residue: the unhatched eggs, pips, and dead chicks left in the trays after removal of the hatched chicks. Hatchery waste or egg residue.

Haugh Units: a measure of egg quality. Eggs are broken onto a level glass pane and the height of the albumen is determined at a standard location. Height values are converted to Haugh Units (H.U.) using a table or formulas that adjust for egg weight. H.U. values range from 0 to 110.

HDL: high density lipoprotein

Head: the most anterior part of the body that includes the skull and brain, face, eyes, ears, beak, comb, wattles and nostrils.

Head spot: a light colored spot in the down on the head of chicks having sex-linked barred feathers. It can be used for identifying the sex of chicks from Barred Plymouth Rocks and some other breeds and crosses.

Heart: the organ that pumps blood throughout the body. It is four-chambered in the bird. The right ventricle moves blood through the lungs for gas exchange whereas the left ventricle moves blood through the remainder of the body. The right ventricle is smaller in the bird in part because the avian lung does not expand and contract, thus it has less variation in resistance to blood flow.

Heart rate: the number of beats per minute, or pulse rate. Heart rate is 200 to 400 beats per minute in the chicken, varying inversely with body size.

Heating degree-day: the difference between the mean daily temperature and the desired temperature. Therefore, with a mean daily temperature of 40°F and a desired temperature of 65°F, heating degree-days would = 25.

Heat loss: birds lose heat by evaporative (respiratory and cutaneous) and non-evaporative (conduction, convection and radiation).

Heat stable: tolerant of high temperatures (e.g., enzymes).

Heavy breed: a standard or commercial breed of chicken having large body size. They commonly lay brown eggs and have red ear lobes.

Helminth: a type of parasitic worm.

Helper T-cell: a T-cell that assists other T-cells or B-cells in responding to an antigen, or which activates other types of cells, such as macrophages.

Hemagglutination inhibition (HI) test: lab test to estimate the amount of antibodies present in a bird against a specific disease.

Hematocrit: the percentage of red blood cells in the blood.

Hematoma: accumulation of blood caused by a break in a blood vessel.

Hemeral: refers to 24-hour cycles. Compare Ahemeral.

Hemoglobin: an oxygen-carrying red pigment of the red blood cells consisting primarily of protein and iron.

Hemorrhage: the leakage of a large amount of blood from a vessel.

Hen: a female chicken that is more than one year old. May be applied to a female bird that is sexually mature (lays eggs).

Hen-day egg production: eggs produced in a given period divided by the number of hens times number of days they were present (eggs/hens x days). Usually expressed as a percentage. It adjusts for hen mortality and is often used in research. It may also be calculated on a daily basis by dividing the number of eggs laid by the number of hens present that day.

Hen-feathered: in some breeds of chickens there is no sexual dimorphism in regard to feathering color and feather shape with both female and male having female type feathering (e.g., Sebright bantams).

Hen-housed egg production: eggs produced in a given period divided by the number of hens in the house at the beginning of the period times the days of the period (eggs/hens started x days). Usually expressed as a percentage. It does not adjust for hen mortality but is a good indicator of profitability.

Hen spectacles or lens: spectacles are small plastic devices that attach to the upper beak and block forward vision of the bird. Lens are red colored contact inserts for the eye.

Both devices aim to prevent or reduce feather picking, cannibalism, and egg eating by the birds.

Hepatic portal system: venous blood flow is diverted to the liver before returning to the heart. It must be considered in procedures in which substances are injected into the legs.

Hepatitis: inflammation of the liver.

Heredity: the transmission of characteristics of an individual to its offspring by means of genes.

Hermaphrodite: an individual with a mixture of male and female sexual organs; a Gynandromorph.

Heterakis gallinae: small, white roundworms found in the ceca that act as a carrier of the organism that causes Blackhead disease. See Cecal worms and Blackhead.

Heterogametic: producing gametes that may contain either male or female chromosomes. The female is the heterogametic sex in birds and some other species whereas in mammals the male is the heterogametic sex.

Heterosis: the offspring have a higher level of performance than the parents. It is referred to as hybrid vigor. Parent lines or breeds that, when crossed, produce chicks with heterosis are described as “nicking”.

Heterozygous: when a pair of autosomal genes at the same locus differ the individual is heterozygous for that character. Offspring will vary according to which gene they receive, thus, heterozygotes do not breed true.

Hibernate: to become dormant, especially in cold weather. Some birds, such as hummingbirds become torpid during the night in a temporary hibernation. See Torpidity and Estivate.

High rise house: cage house in which manure accumulates in a lower level storage space that is cleaned yearly.

Histology: the microscopic study of body tissue structure.

Histomoniasis: a protozoal disease (Blackhead) occurring primarily in turkeys, gamebirds and peafowl caused by *Histomonas meleagridis*, which is often transmitted by the nematode *Heterakis gallinarum*.

Hock: the joint between the tibia and tarsometatarsus bones (between drumstick and shank).

Hock burns: irritation of the skin of the hock joint due to contact with irritants in the litter.

Homeostasis: a tendency to maintain a normalcy and stability in the body.

Homeotherm: an animal that attempts to maintain constant body temperature in all environmental temperatures. However, some may hibernate, estivate or have temporary torpor. Warm blooded.

Homogametic: producing gametes that contain only one type of sex chromosome. In birds the male is homogametic and the female gamete determines the sex of the offspring.

Homozygous: when a pair of autosomal genes at the same locus are the same the individual is homozygous for that character. Parents homozygous for a character will breed true for that character.

Horizontal integration: cooperation among members of a segment of an industry (for example, hatcheries).

Hormone: a substance produced by a gland or tissue and transported by the blood to another tissue or organ (target) where it activates and/or modulates physiological activities. There are also synthetically produced hormones.

Host: an animal that is infected or in some way supports the growth and spread of a micro-organism or parasite.

Host-specific: a disease or parasite that is found on or in a single species or closely related species.

Housing: buildings in which poultry are kept. They vary from small moveable houses in pastures to very large egg production, broiler or breeder houses that are semi-environmentally controlled with birds on litter, slats or in cages. In some geographical areas they are called barns.

Hover: equipment providing heat, insulation and umbrella cover for young chicks during the brooding period.

Humerus: the proximal bone of the wing.

Humidity: the percentage of water vapor in the air. See Relative humidity.

Humoral immunity: an immune response that involves antibodies secreted by B-cells circulating in body fluids.

Hybrid: offspring resulting from the cross of different inbred strains, varieties or breeds. In commercial usage, it refers to crosses developed for specific economic traits and produced on a large commercial scale. The hybrid is often superior to either of the parents.

Hybrid vigor: see Heterosis.

Hydrometer: an instrument used to measure the specific gravity of liquids.

Hygrometer: an instrument that measures the absolute or relative amount of moisture in the air.

Hypercapnia: unusually high levels of carbon dioxide in the blood.

Hyperplasia: an abnormal increase in the number of cells of a tissue or organ.

Hyperthermia: an increase in body temperature above normal; it can be due to a normal physiological process and in response to the environment.

Hypertrophy: the increase in volume of tissue by the enlargement of the cells present.

Hypocapnia: unusually low levels of carbon dioxide in the blood.

Hypophysis: see Pituitary Gland.

Hypoplasia: organ or tissue below normal size.

Hyporachis: a small secondary feather attached to the shaft of a large feather.

Hypostasis: see Epistasis.

Hypothalamus: a gland located near the base of the brain which serves as a photoreceptor, produces gonadotropin releasing hormone (GnRH), and acts in many other roles.

Hypothermia: an abnormally low body temperature.

Hypotrophy: degeneration or loss of function of an organ or tissue.

Hysteria: a condition of hyperexcitement in a flock, occurring in episodes and often lasting for long periods. Birds run aimlessly, pile on one another, receive injuries from toe nails, and feed consumption decreases, growth or egg production decline.

Ice Packed: a form of refrigeration in which processed raw products are packed in containers and then covered with shaved or crushed ice manufactured from water, or dry ice manufactured from carbon dioxide (CO₂).

Ileum: the posterior portion of the small intestine, from Meckel's diverticulum to the large intestine/cecal junction. The anatomy in the bird is not as distinctive as in some species.

Ilium: the dorsal or upper portion of the pelvic girdle. It is the large bone in which the femur articulates.

Imbalanced: refers to a dietary situation in which some necessary constituents are not in the proper amount or ratio to provide optimum nutrition.

Immunity: resistance or protection against a particular disease or infection.

Immunity, active or acquired: immunity induced through response to infection with a pathogen or through vaccination. Response is to a specific antigen using humoral (B, or bursa-derived, lymphocytes) and cell-mediated (T, or thymus-derived, lymphocytes) and includes memory development to that antigen.

Immunity, innate: immunity that is a rapidly induced broad response to infectious microbes using phylogenetically encoded receptors (pattern recognition receptors).

Immunity, passive: immunity that occurs without infection or vaccination. One source of passive immunity is maternal antibodies passed through the egg to the chick.

Immunize: to produce immunity, usually by inoculation.

Impaction: blockage of an organ such as crop, gizzard, or oviduct.

Impingent air jet: air traveling along a smooth surface, such as a ceiling or side wall. Such air jets will travel approximately 25% further than a similar air jet in open space.

Imprint: the behavior and memory of a young bird is fixated on another bird, animal or object in such a manner that it elicits certain responses in later life.

Inanition: condition resulting from lack of food or lack of ability to assimilate it.

Inbreeding: the mating of closely related birds, usually for several generations.

Inclusion body hepatitis: an acute infectious disease of the liver caused by an adenovirus.

Incross: offspring resulting from the mating of inbred lines of the same breed.

Incrossbred: offspring resulting from the mating of inbred lines of different breeds.

Incubation: the process by which eggs are placed in an appropriate environment for development of the embryo. One or both of the parents sit on eggs to naturally incubate eggs. Artificial incubation involves providing cabinets in which eggs are exposed to appropriately controlled temperature, humidity, air exchange and movement, egg orientation and turning frequency.

Incubation position: under commercial conditions eggs of most poultry are incubated with the large end up and turned at one hour intervals around the short axis to approximately 45 degree angles until a few days before hatching. Eggs from all poultry and especially those with large eggs, such as the goose, may be incubated horizontally and turned around the long axis. Most eggs in natural nests will be incubated horizontally.

Incubation temperature: the normal incubation temperature is approximately 99.5°F (37.5°C) but the ideal temperature varies with age of embryo and its heat production,

humidity, species, and strain. Single stage and multistage incubators will have different ideal temperatures.

Incubation time, hatch time: 1) the time (days or hours) required for the embryo to fully develop from the time of setting in the incubator to emergence from the egg. It usually does not include the development time (about 20 hours) while in the hen's oviduct. Approximate incubation times (days) for common species are: chicken, 20-21; turkey, 26-28; duck, 26-28; muscovy duck, 35-37; geese, 30-35; pigeon, 17-19; bobwhite quail, 23-24; coturnix quail, 16-17; pheasant, 23-24; ostrich, 40-42. 2) Incubation period may also refer to the time between exposure to a pathogen and the onset of clinical signs.

Incubator: the cabinet or machine in which eggs are placed for development and hatching. The setter accommodates the eggs during the major portion of incubation (the first 18 days in chickens), whereas the hatcher accommodates the eggs during the hatching process (the last 3 days of incubation). Incubators may be Single stage or Multistage and forced draft or still air.

Indeterminate layer: the number of eggs per clutch is not strictly pre-set and the number of eggs may vary with weather, food supply, competition, etc. Birds such as chickens, which will continue to lay an indefinite number of eggs if eggs are removed from the nest, are indeterminate layers. See Determinate layer.

Inedible eggs: eggs that are not allowed for human consumption. They are segregated and typically sold to pet food companies.

Infection: invasion of the body or some part of the body by a pathogen.

Infectious Bronchitis: a common, serious, very infectious viral disease of poultry. May cause high mortality, especially in young birds. Layers may have severe drop in egg production and rough, thin, ridged, or mis-shapen egg shells. Vaccines are available.

Infectious Bursal Disease: an immune system disease of the young chicken that is caused by a virus. Historically called Gumboro Disease. The disease causes a decreased immunity and a decreased ability to respond to vaccination or infection. Vaccines are available.

Infectious coryza: see Coryza.

Inferior umbilicus: opening in the tip of the feather quill.

Infertile: an egg that has not been fertilized; there has been no union of sperm and ovum.

Inflammation: a reaction of some part of the body to injury, irritation, infection or some other insult that causes pain, swelling, redness, increased temperature or even loss of function.

Influenza: avian influenza is a viral disease of the respiratory system. Several types of the virus are known; most have low virulence, however, one or more type causes severe mortality.

Infra-red heater: brooders or heaters utilizing infra-red radiation as the heat source. The amount of visible light emitted varies with the type.

Infundibulum: the most anterior section of the oviduct. Funnel shaped and open to receive or engulf the ovulated ovum. Becomes very active at the time of ovulation. It is the site of fertilization. See Oviduct.

Ingest: to take food into the mouth; to eat.

Inhibiting gene: a gene that inhibits, suppresses or prevents expression of another gene.

Injection: the introduction of an organism or substance into the body by the following common routes: subcutaneous (sub-Q) or under the skin; intramuscular (I.M.) or into a muscle; intraperitoneal (I.P.) or into the body cavity; and intravenous (I.V.) or into a vein.

In-Line egg production: the arrangement of egg conveyor and processing equipment into one or more straight lines to facilitate the movement of shell eggs directly from the laying house(s) to the grading and packing or further processing areas.

Inner thin: a layer of thin albumen between the chalaziferous and thick albumen layers in the egg. See Albumen.

In ovo: within the egg.

Insectivorous: eating insects and small arthropods as the primary food.

Insemination: placement of semen from the male into the oviduct of the female. Artificial insemination is essential in commercial turkeys and can be used in some breeds of chickens and other species to improve fertility. It is often used in research studies of reproduction and in some breeding programs. Artificial insemination is labor intensive.

Insoluble grit: see Grit.

Insulation: a material that minimizes the transfer of heat into or from a structure, machine or cabinet. To accomplish this efficiently the material must contain a large number of small, isolated dead air spaces. Such materials will reduce heat transfer by radiation, convection and conduction. Feathers and fat layers provide insulation for the bird's body.

Integrator: (Vertical integration) coordination of various levels of producing, processing and distributing under one decision making unit, generally through direct ownership of the different stages or through contracts. A vertically integrated firm will consist of breeder flocks, hatcheries, feed milling and delivery, growout **units**, processing plants, further processing plants, and delivery to buyers.

Integument: the external body covering including the skin, feathers, beak, comb, wattles, scales and nails.

Intensity: 1) as applied to egg production, it is the rate of lay over a given period of time.
2) As applied to lighting, it is the amount of light per unit area.

Intensive system: maintenance of birds entirely in buildings in high concentrations consistent with welfare and production.

Intermediate host: some parasites of birds spend a stage of their life in another animal such as snails or earthworms, which are the intermediate host.

Intermittent lighting: a lighting program in which the “light period” is broken into multiple short periods of light and dark. Interrupted lighting. Also called Biomittent.

Internal layer: at ovulation the ovum (yolk) is not engulfed by the infundibulum but remains in the body cavity. Small numbers of these yolks can be absorbed but if large numbers remain in the cavity yolk residue may accumulate. Some affected birds may develop a “penquin” posture. See Egg yolk peritonitis.

Internal parasites: organisms that live within the body of the bird (host). It commonly refers to worms or protozoa.

Intestines, intestinal tract: organs involved with eating, digesting and excreting foodstuffs. These organs in order are: mouth, esophagus with crop, proventriculus, ventriculus or gizzard, duodenum, jejunum, ileum, ceca, large intestine, and cloaca.

In vitro: “in glass”; occurring outside of the living animal.

In vivo: “in living”; occurring within the living animal.

Iris: the round, muscular, pigmented membrane around the pupil of the eye that changes the size of the pupil to regulate the amount of light entering the eye.

Ischium: the large posterior portion of the pelvic girdle or hip.

Isolation: keeping a bird or flock of birds in a separate location from other birds taking all precautions to prevent transfer of diseases or parasites to or from the flock. It is part of the biosecurity program.

Isthmus: the narrow, thin walled portion of the oviduct in which the shell or egg membranes are formed around the albumen. It is located between the magnum and shell gland. See Oviduct.

Jejunum: portion of the small intestine from the duodenum to the ileum, the junction of which is marked by Meckel’s diverticulum in most birds.

Joint: the junction between two bones, especially where bones articulate.

Joule: a unit of energy or heat. One joule = 0.24 calorie (approximately).

Jugular vein: carries blood returning from the head and neck.

Kafir or kafir corn: a grain sorghum grown for grain and fodder.

Keel: the large projection of the sternum or breastbone to which the large flight muscles of the breast are attached. Flightless birds (e.g., ostrich) do not have a keel.

Keet: a very young guinea fowl.

Keratin: a protein that forms much of the structure of feathers, leg scales, toe nails, and beak of birds. It has a high sulfur content due to the amino acid cystine.

Kidneys: paired organs of the urinary system that are attached to the dorsal wall of the body cavity. They remove waste products from the blood by filtration and active transport. They also function in acid-base balance, mineral absorption and reabsorption, and water balance.

Killing cone: an open-ended, hanging, metal cone in which birds can be placed with head extended outside the small end allowing the throat cut in slaughtering. Used in home or small processing units.

Knee: the joint between the upper leg (thigh) and lower leg (drumstick).

Knob: 1) the horny bulge on the upper bill of Chinese and African geese; 2) the bulge in the skull of crested birds.

Kosher birds: those processed and sold in accordance with Jewish dietary laws or customs.

Lacing: a different colored edging around a feather.

Lagoon system: a method of treating manure from caged layers in which the manure is placed in a large pond of water and allowed to be digested by bacteria, usually anaerobic. Some systems grow fish in the pond.

Lamella: the tooth-like serrations of the inner edges of the bill of ducks and geese.

Large intestine: a short portion of the intestine extending from the ileocecal junction to the cloaca, functioning primarily in water absorption. The large intestine of some birds, e.g., ostriches, is very large and appears to function in the digestion of fiber.

Laryngotracheitis: a viral disease of the upper respiratory tract. Severe mortality can be prevented by vaccination.

Larynx: the anterior end of the trachea functioning to prevent food and water from entering the trachea during swallowing. It is not involved in vocalization.

Late-hatch: chicks that hatch later than is normal for that species, breed, or strain and age of breeder. These chicks are often less viable than normal.

Latent: present but unseen; hidden, inactive or undeveloped.

Latent heat: heat lost through the process of evaporation. See Evaporative heat loss.

Lateral: refers to the side or toward the side.

Layer: a sexually mature female producing eggs. In common usage, the type of bird producing eggs for consumption.

Layer cycle: the period of the layer's life from onset of lay until cessation of lay and a natural molt. The cycle may be shortened for economic purposes in commercial flocks.

L.D.-50: a lethal dose to one half of individuals treated.

LDL: low density lipoprotein

Leaker: an egg that has a crack or break in the shell and shell membranes to the extent that the egg contents are exposed or are exuding or free to exude from the shell.

Leg: the limb on which the bird walks: thigh, drumstick and shank.

Leg Band: bands of plastic or metal placed around the bird's leg as a means of identification. It may be a simple color code or it may have a number or bar-code.

Leghorn: a breed of chicken of the Mediterrean Class that has been used extensively as a base breed for egg production purposes. It produces a white-shelled egg.

Leg quarters: the rear portion of a ready-to-cook young chicken consisting of the drumsticks, thighs and back portion. This item is marketed at retail or further processed.

Legume: any of thousands of plant species that have seed pods that split along both sides when ripe. Some of the more common legumes are beans, lentils, peas, and soybeans. Legumes have the unique ability to obtain much or all of their nitrogen requirements from symbiotic nitrogen fixation.

Lesion: abnormal tissue caused by injury, disease, parasite, etc.

Lethal gene: a genetic condition that results in abnormal development and death of the embryo. In some cases the embryo may survive beyond hatching but then die, either directly due to the condition or indirectly due to blindness or other conditions that prevent normal activities (facultative or contingent).

Leucosis: a viral disease of birds causing enlargement of the liver, spleen and kidneys as the bird grows and matures. Partially prevented by vaccination. The complex of diseases include Marek's disease, Lymphoid leucosis, osteopetrosis, erythroblastosis, and reticuloendotheliosis.

Leukocyte: a type of white blood cell that is involved in the immune system. Some (macrophage) engulf and destroy infectious agents and cellular debris.

Libido: the urge for sexual activity.

Lice: see External parasite.

Life cycle: a series of developmental stages through which worms, insects, protozoa and other organisms progress during their complete life.

Ligament: strong connective tissue holding bones together or holding organs in place.

Light breed: breeds of chickens, such as Leghorns, that generally have characteristics such as small body size, higher metabolic rate, non-broodiness, and high rate of egg production.

Lighting: for a detailed glossary of lighting terminology see Lewis and Perry, 1990, Br. Poult. Sci. 31:677-684. See Light Schedule.

Light schedule or pattern: the hours of light and dark (L:D) to which birds are subjected each 24-hour period, including natural and artificial light, intensity, light color, and changes in light.

Light stimulation: the use of light to stimulate the hypothalamus, pituitary and pineal glands resulting in stimulation of the reproductive system and other effects.

Limberneck: a condition caused by botulism poisoning. **See Botulism.**

Line breeding: a system of inbreeding emphasizing use of descendants from a specific ancestor or group of ancestors.

Lipid: a group of chemicals including oils, fats, waxes and similar substances, many of which are constituents of cells and necessary in the diet.

Liquid egg: contents of egg (albumen, yolk, or both) that have been removed and handled in bulk.

Litter: materials used on the floor of poultry houses. Common litter materials are wood shavings, sawdust, rice hulls, peanut hulls, chopped straw and shredded paper. See Deep litter **and Bedding.**

Litter amendments: chemicals applied to poultry litter to alter pH, NH₃ volatilization, moisture, microbial growth and other characteristics.

Livability: usually expressed as the percent of birds living to a specified age.

Liver: the large brown organ that functions to assimilate nutrients that are digested, produce various products of metabolism, detoxify toxins, remove metabolic wastes, secrete bile, and other functions.

Lobe: fold(s) of skin that hang from the abdomen of some breeds of geese.

Long day: a daylength sufficiently long to induce hormone release and gonadal growth.

Loose eggs: eggs packed in trays, flats, or non-carton containers that have not been sized and candled for quality.

Lopped comb: a comb falling to one side; normal for most hens with single combs.

Louver(s): a window or opening having a series of sloping slats of glass, plastic, wood, metal or other material that are movable and admit light and/or air but prevent backflow of air or rain. May be located on the inside or outside of ventilation fans, open and close by gravity or motorization, to prevent the flow of air through the fan when it is not operating.

Lumen: 1) measure of illumination. The light emitted by a point-source of 1 candle power; 1 lumen = 0.001496 watt. See Lux and Footcandle. 2) The cavity within a duct or organ.

Lungs: paired, non-elastic organs in the thorax with the function of gas exchange. Air sacs push air through a complex air capillary system where gas exchange occurs. It is a flow-through system with no blind pouches in the lungs.

Lux: measure of illumination. One lux = 1 lumen per m² = 0.0929 footcandle; 1 footcandle = 10.76 lux = 1 lumen per ft². See Lumen and Footcandle.

Lymphatic system: a network of small vessels that collect the watery fluid found in intercellular spaces. Includes lymph nodes that are structures associated with the lymph vessels and which produce lymphocytes and function as part of the immune system.

Lymphocyte: a type of white blood cell derived from the thymus or bursa of Fabricius that functions in the immune system.

Lymphokine: a substance produced by T-cells that have been stimulated by an antigen. It may be involved in cell-mediated immunity, activation of macrophages or influencing the amount of antibody production.

Lymphomatosis: see Marek's disease.

Lysine: an essential amino acid that is often added to the diet in synthesized form.

Lysozyme: a protein in egg albumen; it lyses some bacteria.

Macroclimate: see microclimate.

Macrophage: a phagocytic tissue cell of the reticuloendothelial system that is involved in protection of the body against infection and toxins. They may become mobile when stimulated by immune reactions, microbial products or inflammation. They may interact with lymphocytes in antibody production.

Magnum: the longest portion of the avian oviduct, posterior to the infundibulum and anterior to the isthmus. Its primary function is secretion of the egg albumen. See Oviduct.

Main tail feathers: stiff, long and straight feathers of the tail. Rectrices.

Maize: *Zea mays*; see Corn.

Male reproductive system: consists of paired testes, epididymi, ductus deferens, phallus and accessory glands. The accessory glands are the paraclacal vascular bodies, dorsal proctodeal gland, and lymphatic folds, all of which are associated with the cloaca.

Malformation: embryos with abnormalities ranging from minor to severe. There are numerous causes for malformations.

Malposition: embryonic positions in the egg that are not normal for that specific stage of development and for that species. Some are fatal, e.g. head under left wing, whereas others such as beak over right wing may be normal variants. A common malposition is head in the small end of the egg, commonly caused by incubating the egg with the small end up. See Hatch position.

Mammillary layer: the inner egg shell layer that is attached to the outer egg membrane. Its inner surface knobs are amorphous in nature.

Mandible: the lower beak.

Manometer: an instrument used to determine liquid or gas pressure; used to measure the difference between inside house and outside atmospheric pressure, usually expressed in inches of water in a water column.

Manure-belt house: cage house in which manure is caught on a belt from which it is removed daily.

Marek's disease: a neoplastic disease affecting lymphocytes, causing skin lesions and tumors, and affecting the neural tissue causing paralysis. Vaccination of 18-day embryos or chicks at hatching provides protection. Viruses are the causative agents. See Leucosis.

Mash: feed ingredients ground into small particles and mixed to provide a complete diet.

Mate: the pairing of male and female for reproduction.

Maternal: pertaining to the mother.

Maternal antibodies: antibodies of the hen that are transferred to the chick through the egg yolk.

Mating ratio: the number of females mated to one male. It varies with age, breed and species. The common ratio in commercial chickens is 1 male to 9 to 12 females.

Maturity: the female is considered to be sexually mature at the age when the first egg is laid. The male is mature when sufficient sperm are produced to result in a fertile mating. In some cases it refers to the age at which body growth plateaus.

Meat bird: commonly refers to broilers or the type of birds used for broilers.

Meat meal: a feed ingredient produced by cooking, drying and grinding animal products not used for human consumption. It is usually high in protein. Meat meal is a possible mode of transmission of prions related to mad cow disease as well as bacterial organisms.

Meat and bone meal: similar to meat meal except it contains some ground bone and therefore has a higher level of calcium and phosphorus.

Meat spots: structures found in egg albumen, usually by candling. They are usually small bits of egg shell cuticle, oviductal or ovarian tissue, or degenerated blood.

Mechanical feeder: motorized, power driven feeding equipment that distributes feed from a large feed hopper to a long trough or a series of hanging feeders. They may be time controlled and include scales for weighing the feed.

Mechanical ventilation: the use of fans to ventilate poultry houses.

Mechanically separated: the manufacturing of poultry products in a paste-like form with the consistency of cake batter. Various poultry items (backs, rib cages, carcass shell, etc) are put through a de-boning machine. This machine operates on the differing resistance of bone and tissue pushed under high pressure through small holes to separate the bone from the edible paste-like product.

Meckel's diverticulum: the remnant of the embryonic yolk sac attachment to the small intestine. It is used as a marker indicating the end of the jejunum and start of the ileum.

Meconium: the greenish fecal material forming the first bowel movement of the newly hatched chick.

Medial: toward the middle or midline of the body.

Mediterranean breeds: a group or class of chickens that includes Leghorns and Minorcas. They are usually small, non-broody, high egg-producing, active, and lay white shelled eggs.

Medullary bone: bone deposition primarily in the medullary (hollow center) of long bones of the female bird in active egg production that is stimulated by estrogen and androgen. It is very dynamic, being removed for shell deposition and replaced before the next shell is formed.

Meiosis: cell division in which the number of chromosomes is changed from diploid of somatic cells to the haploid of gametes.

Melanin: a protein pigment that provides color to the feathers, leg skin and beak. The color is usually black, blue or slate but may also be red or brown.

Mesentery: connective tissue or membranes that support the digestive system and some other organs, attaching them to the inner body wall or other organs.

Mesoclimate: see Microclimate.

Mesoderm: the middle layer of embryonic cells that develop into specialized tissues or organs such as skeleton, digestive system, reproductive system and blood.

Metabolic rate: see Basal metabolic rate.

Metabolism: the chemical and physiological processes in the body such as food digestion, breaking down of some substances (catabolism) and building other substances (anabolism).

Metabolizable energy (ME): the total energy consumed by the bird minus the energy excreted in the urine and feces. Digestible energy is the energy assimilated or absorbed by the bird for its physiological use. Existence energy (EE) is ME minus energy used for growth, feathers, reproduction and fat deposition, which is productive energy (PE).

Metacarpus: bones of the wing distal to the radius and ulna and to which phalanges are attached.

Metamorphosis: change in shape, structure or function resulting from development.

Metatarsus: the bone of the leg referred to as shank and to which the phalanges (toes) are attached.

Methionine: an essential amino acid containing sulphur that is an important part of the structure of proteins such as those in feathers, beak and scales. It is usually considered to be the first limiting amino acid and is commonly supplemented into diets.

Microbially mediated immunodevelopment: the antigenic effect of intestinal bacteria on the development of gut associated lymphoid tissue (GALT), Peyer's patches and other immunological activities of the gut.

Microclimate: in relation to poultry it is the environment immediately surrounding the animal. Compared to mesoclimate (in the house) and macroclimate (outside the house).

Microingredient: components of the diet that are included in minute amounts (normally vitamins and minerals other than calcium and phosphorus).

Micromelia: an embryonic abnormality characterized by dwarfing and shortened bones of the legs and wings. It is usually lethal.

Microphthalmia: an embryonic abnormality in which one or both eyes will be very small or missing.

Microswitch: a small electrical contact used in controls of incubators and other equipment.

Middlings: a byproduct of wheat milled for flour that comes from the layer of the kernel under the outer husks. It is a common feed ingredient.

Millers offals: discarded parts of milled grain, such as middlings, bran and wheatings, that can be used in animal feeds.

Milk, dried skimmed: a dried milk product that can be incorporated into poultry feeds.

Millet: a small grain (e.g., pearl millet) used as a feed ingredient.

Milo: grain sorghum used in diets in place of maize.

Minerals: the inorganic elements utilized by the bird in metabolism. Some, such as calcium and phosphorus, are required in relatively large amounts, whereas others, such as iodine, zinc and cobalt, are required in very small amounts. Some may be added to the diet as organic complexes.

Minimally processed: a process which does not fundamentally alter the raw meat product (USDA definition).

Mites: see External parasites.

Mitosis: cell division of somatic cells.

Molasses: a thick, dark syrup produced during sugar refining or from sorghum or other sources that can be used as a feed ingredient.

Molt: the casting off of old feathers followed by their re-growth. In natural environmental conditions this occurs seasonally and is associated with atrophy of the reproductive system. In poultry management systems the molt and associated atrophy and re-growth (recrudescence) of the reproductive system are induced or “forced” by manipulation of the lighting system and nutrition to result in rejuvenation of egg production and egg quality.

Mongrel: mixed-breed bird resulting from indiscriminate matings.

Moniliasis or candidiasis: an upper digestive tract fungus infection (thrush), often caused by *Candida*, and more common in turkeys.

Monochromatic: light with one color, or a very narrow range of wavelengths.

Morbidity: the number or percentage of a flock that is affected by disease or parasitism.

Morphogenesis: structural changes that occur during the development of an organ, tissue, or individual.

Morphology: the study of form and structure of living organisms.

Mortality: the birds that die, often expressed as a percentage. Death rate as opposed to Livability.

Mottling: 1) in feathers it refers to dark feathers with some of them having a white tip, as in the Anconas breed (compare to Spangling). 2) In eggs the yolk is discolored with splotches of green or other abnormal colors.

Mucosa or mucous membrane: the lining membrane of body cavities and canals, such as digestive and respiratory systems, that connect with the external air.

MUFA: monounsaturated fatty acids. See also PUFA.

Muff: a tuft of feathers on the sides of the head of some breeds, e.g., Houdans.

Mule duck: the cross between a Muscovy and another domestic duck for use for meat purposes. The cross is sterile. See Muscovy.

Multi-age farm: a farm with more than one age-group of chickens.

Multiphase feeding: altering dietary composition to meet anticipated nutrient requirements as they change with age, productions or conditions.

Multiplier farm: a farm that produces hatching eggs from breeder stock supplied by a breeding company and which results in chicks that are used commercially as broiler chicks or layers.

Multi-stage incubation: incubation system or incubator having two or more ages of embryos in each machine. See Incubator and Single stage incubation.

Muscovy: a type of domestic duck (*Cairina moschata*) having crest, red wattles and horizontal carriage and originating in South America. They make a wheezing sound rather than a quack. Can be crossed with other domestic ducks for meat purposes but the cross is sterile (a mule).

Mushy chick disease or omphalitis: an abdominal or navel infection of chicks acquired during the hatching process. Controlled by strict sanitation in the hatchery, incubators and hatchers.

Mutation: a sudden permanent variation in an inherited character of an animal.

Mycoplasmosis: diseases caused by various types of *Mycoplasma*, which are organisms smaller than bacteria and larger than viruses and that lack a cell wall. *Mycoplasma gallisepticum*, *M. synoviae* and *M. meleagridis* are the most common and are egg transmitted. Controlled mostly by eradication and prevention.

Mycosis: a disease caused by a fungus.

Mycotoxicosis: effects due to mold toxins from one or more mold species. Common toxins are aflatoxin, ochratoxin and T-2 toxin.

Myoglobin: an iron-containing protein, similar to hemoglobin, that is found in muscle and influencing muscle color as well as supplying oxygen.

Nares: the external opening of the nostrils.

Natural: a product containing no artificial ingredients or added color and is only minimally processed (USDA definition).

Naturally raised: chicks or other animals that received no growth promotants or antibiotics (except ionophores), and were fed no animal byproducts.

Natural ventilation: air circulation is provided by opening poultry house doors, windows, or curtains allowing the wind to draw air through the house.

Navel: the scar indicating where the umbilical cord containing the blood vessels to embryonic membranes passed through the body wall. The condition of the navel of the newly hatched chick is used as an indication of the quality and general health of the chick. See Umbilicus.

Necropsy: examination of a dead body; a post-mortem examination or autopsy.

Necrosis: the death and decay of cells in a specific part of the body of a living animal.

Necrotic enteritis: a type of enteritis caused by the organism *Clostridium perfringens* producing necrosis of the epithelial lining of the small intestine and resulting in death.

Nematode: roundworms that are usually unsegmented; include ascarids, gape worms, gizzard worms, capillaria and heterakis that parasitize poultry.

Neonatal: newly-born or hatched.

Neoplasm: abnormal growth of tissue, such as a tumor.

Nephritis: acute or chronic disease of the kidneys, including inflammation and degeneration.

Nest: in nature it is a place selected or a structure built by birds to lay their eggs and protect their young. Commercial poultry are provided nest structures with padding in which the hens may lay their eggs.

Nest egg: an artificial egg placed in a nest to entice hens to lay eggs there.

Nesting behavior: in domestic chickens this involves a period of investigating nests, selection of a nest, oviposition, exit from the nest, often followed by cackling for a short time.

Nestling: a young bird still in the nest.

Nest run eggs: eggs that are packed as they come from the production facilities without having been washed, sized, and candled for quality, except that some checks and dirties and other obvious undergrads have been removed.

Net energy: metabolizable energy minus the energy used during digestion.

Newcastle disease: a respiratory and nervous system disease caused by various strains of a paramyxovirus. Commercial birds are vaccinated multiple times and with different virus strains for prevention of the disease.

New York dressed: a processing method in which a fresh plucked chicken carcass is offered for sale without evisceration and refrigeration.

Niacin, nicotinamide or nicotinic acid: a vitamin of the B complex type. A deficiency may cause hock and leg problems, diarrhea, and inflammation in the mouth.

Nick or nickability: see Heterosis.

Nicotinic acid, nicotinamide: see Niacin.

Nictitating membrane: a transparent third eyelid in birds that blinks to keep the eye clean and moist. The upper and lower eyelids remain open when the bird is awake. See Eyelids.

Nide or nye: a brood of pheasants.

Nidicolous: birds that stay in the nest for some time after hatching. See Altricial, Precocial, and Nidifugous.

Nidifugous: birds that leave the nest immediately after hatching. See Precocial, Altricial, and Nidicolous.

Nits: the eggs of lice in the form of clusters of small white spheres at the base of feathers.

Nitrogen-free extract: carbohydrates in the feed utilizable by poultry. Does not include indigestible carbohydrates contained in crude fiber.

Nocturnal: refers to the dark period or night; the period between the light/dark and dark/light interfaces.

Non-phytate phosphorus: P not bound to an organic molecule. Inorganic P.

Noodling: force-feeding geese with noodles or other feedstuffs to produce pate de foie gras, a product of fattened goose livers. See Cramming.

Northern fowl mite: an arachnid parasite, very small, that lives on the bird and often is found in higher concentrations among the feathers of the abdominal area. It lives on the blood of the bird.

Nose or nostril: the external opening of the respiratory system and the organ of smell.

NSP: non-starch polysaccharide; a component of ingredients that can affect digestion and may be a concern in feed formulation.

Nuptial plumage: plumage of the male just before and during the breeding season.

Nutritional encephalomalacia: “crazy chick disease” caused by a vitamin E deficiency.

Oats: a cereal grain, relatively high in fiber, that is used in some types of diets, e.g., molting diets.

Offal: the waste material from poultry processing, excluding feathers, that is useful as a feed ingredient when cooked and prepared as a meal.

Oil gland: see Uropygial gland.

Olfaction: the sense of smell; a chemically based sense.

Olfactory organ: an organ involved in the sense of smell, usually the internal cellular lining of the nostrils.

Olive yolks: greenish color in yolk often caused by feeding cottonseed meal.

Omega-3 fatty acids: examples are linolenic, docosahexenoic, docosapentenoic, and eicosapentenoic that have health promoting effects and are used to produce designer eggs.

Omnivorous: eating both animal and vegetable foods. Eating anything.

Omphalitis or mushy chick disease: navel and abdominal infection in the young chick. Prevented by strict sanitation in the hatchery and breeder farm.

Ontogeny: the life cycle of an individual

Oocyan: the pigment in some green- and blue-shelled eggs.

Oocyst: the starting and ending stage of the life cycle of coccidia. An encapsulated form that is very resistant to the environment.

Oocyte: an ovum that has not begun the growth and maturation process.

Oogenesis: the process of formation of ova in the ovary.

Organic acids: acids that are produced by plants, animals or microorganisms that have antimicrobial activity (e.g., citric acid, fumaric acid, lactic acid, and formic acid).

Organic production: production of poultry in living conditions that facilitate natural behavior and provide outdoor access, use preventative health management with no antibiotics or drugs, fed certified organic feed (feed ingredients and pasture are produced without synthetic fertilizers and pesticides), grown according to organic plan, and entire operation inspected by auditors.

Organoleptic: involving senses such as taste, smell or sight.

Orientation: positioning of the long axis of the embryo in respect to the long axis of the egg.

Orifice: 1) the opening of an organ or body cavity. 2) With mechanical ventilation, the most restrictive area of the air inlet or the circular area in which the fan operates.

Ornamental breed: a type of bird bred for appearance and show rather than for economic traits.

Ornithosis: a viral respiratory disease of birds that can be transmitted to man.

Orts: fragments of feed remaining in feeder.

Osmoreceptor: cells or tissue that respond to the concentration of sodium or other cations that affect osmotic concentration.

Ossification: the process of bone formation, usually changing from cartilage.

Ostrich: the largest living bird (*Struthio camelus*), flightless, native of Africa and Near East, that is used commercially for meat and feathers. Feet have only 2 toes.

Outbreeding: breeding of unrelated birds.

Outcross: mating birds of one inbred strain to those of another strain that is unrelated, although often of the same breed.

Outer thin: a thin layer of albumen around the equatorial region of the egg between the thick albumen and shell membranes. See Albumen.

Ovalbumin: the major protein in egg albumen; it contains an enzyme inhibitor and will bind some minerals.

Ovary: female gonad or reproductive organ that produces reproductive cells (ova) and secretes hormones such as estrogen. In most domestic birds only the left ovary is functional. During egg production a few large follicles of graded size and numerous very small follicles are present.

Overhead expenses: business charges that occur, such as management and building maintenance expenses, even when the business is idle. Also known as fixed expenses or costs.

Oviduct: a tubular organ of the female reproductive system. The anterior end is attached to the body wall near the ovary and the posterior end terminates at the cloaca. It functions to pick up the ovulated ovum (by the infundibulum) and to deposit albumen (by the magnum), egg membranes (by the isthmus) and egg shell (by the shell gland) around the ovum. The vagina functions in sperm storage and in the oviposition or laying of the egg. Most eggs will move through the oviduct small end first then rotate into the vagina with large end first for oviposition. In most domestic birds the right oviduct is very small and non-functional.

Oviparous: type of animals producing eggs that hatch after oviposition, outside of the female body, e.g., birds. See Viviparous and Ovoviviparous.

Oviposition: to deposit or lay an egg. Extrusion of the egg from the body, usually large end first.

Ovoflavoprotein: a protein in egg albumen; it binds riboflavin.

Ovoglobulin G₂ and G₃: proteins in egg albumen; they have good foaming characteristics.

Ovomacroglobulin: a protein in egg albumen; it has antigenic effects.

Ovomucin: a protein in egg albumen; it inhibits viral hemagglutination.

Ovomucoid: a protein in egg albumen; it inhibits trypsin.

Ovotransferrin: a protein in egg albumen; it has metal binding properties.

Ovoviviparous: animals that produce eggs with membranes that hatch within the female body and young are born alive, e.g., some reptiles. See Oviparous and Viviparous.

Ovulation: the release of the ovum from a ruptured ovarian follicle into the body cavity.

Ovum or ova (plural): the female reproductive cell formed in the ovary, which consists of a very small genetic nucleus and a very large portion of nutrient yolk material (see Polylecithal), all of which is enclosed in the thin vitelline membrane. The genetic nucleus is seen as the germinal disc on the surface of the yolk and is that part combining with spermatozoa at fertilization.

Oyster shell: small pieces of the shell of oysters that can be used as a source of soluble grit and calcium for bone and eggshell formation. When used, it is commonly fed as a separate supplement.

Pad or footpad: sole of the foot.

Pad cooling: an evaporative cooling house which uses wetted pads with fans to move the air into or out of the house.

Pair bonding: development of fidelity between mated birds.

Palatability: the acceptability of a feedstuff to the bird. Influenced by taste, smell, moisture, particle shape and texture, color, and previous experience with the feedstuff.

Pancreas: a gland located between the duodenal loops of the small intestine. It functions to produce insulin, glucagon, somatostatin and avian pancreatic polypeptides.

Panting: rapid and heavy breathing caused by high environmental temperature or physical exertion. Can cause hypocapnia and alkalosis.

Pantothenic acid: a vitamin in the B-complex group that is required for normal hatchability and many other functions.

Parasite: an organism that lives within or on another (the host), usually doing harm without any benefit to the host. See External parasites and Internal parasites.

Parathyroid: small glands in the neck area near the thyroids that produce a hormone that functions in maintaining blood calcium levels. The primary target organs are bone and kidneys.

Paratyphoid: disease produced by a salmonella organism that can cause very high mortality.

Parenteral: introduced into the body by some route other than the digestive tract, often by injection.

Parrot beak: an abnormal development of the upper beak in which it is severely curved downward as the beak of a parrot or hawk. Often seen in abnormal embryo conditions such as chondrodystrophy.

Parson's nose: the tail of the processed carcass. Also, Pope's nose.

Parthenogenesis: the development of an embryo from an ovum without fertilization by sperm. Normal in some lower forms but can occur in birds at a very low rate and those embryos are male. In most cases the development is unorganized and minimal, but a few can hatch.

Pasted vents: accumulation of diarrhea-type fecal material or thick urine around the cloacal opening (vent), especially in young chicks, that is usually associated with disease or mismanagement.

Pasteurellosis: diseases such as Fowl Cholera caused by the organism *Pasteurellia*.

Pate de foie gras: a paste made from fatty goose livers; considered to be a delicacy.

Pathogen: a micro-organism or infective agent that can cause disease.

Pathogenicity: the virulence or potential for a pathogen to cause disease.

Pathogen pressure: the severity and number of infectious organisms within the area or environment to which birds are exposed.

Pathology: the nature of structural and physiological changes caused by disease, and the field of study dealing with them.

Paw: chicken feet prepared for food.

Pea Comb: a relatively small, low-set comb that is dominant to Single Comb. It is present in some of the original breeds used for meat production stocks and has been found to be associated with lower fertility.

Peafowl: birds of the genus *Pavo*. The most common domesticated peafowl is *Pavo cristatus*, which has very large, colorful tail feathers that the male displays. The male is a peacock and the female is a peahen.

Peak production: the point in the egg production period when the rate is at its highest.

Peanut: see Ground nut.

Peck: strike or pick up with the beak or bill.

Pecking order: a social or aggressive order among a flock of birds in which birds of the higher order peck all those at a lower order. Males and females usually have separate hierarchies.

Pecten: a very vascular pleated structure with melanin pigmentation that projects from the retina of the avian eye. It appears to function to provide nutrition to the retina through the vitreous body.

Pectoral muscles: the two large muscles of the breast; flight muscles. The large superficial pectoralis major is responsible for drawing the wing downward whereas the smaller deep pectoralis minor is responsible for raising the wing during flight.

Pedigree breeding: a method of selecting breeding stock on performance, which may include the performance of ancestors, siblings and progeny.

Pellets: feed that has been compressed into small, rounded particles. Steam is used and heat is produced. See Crumbles.

Pelvic girdle: consists of hip bones and sacral bones and includes the ilium, ischium and pubis bones. The bottom of the girdle is open and will expand when the bird is in egg production.

Pen: an enclosure for keeping birds. It may have litter, raised wire, or other type of floor. The group of birds in a pen may be referred to as “pen of birds” or “pen-mates”.

Penciling: several types of colored lines or markings on feathers.

Pendulous crop: enlarged, bulging crop that, in some cases, is caused by improper and incomplete emptying. The crop contents may become fermented.

Penguin body position: the abnormal body position of a chicken hen that is similar to that of a penguin. Often seen in hens with accumulated yolks in the body cavity.

Perch: a horizontal pole or rod used as a resting place (roost) by birds.

Perchery: supplemental perches provided for layers to enable an increased stocking density. Some of the perches may have feeders and water fountains.

Performance: an economically important, measureable trait of a bird or flock, for example, egg production, body weight gain, feed efficiency, egg weight, mortality, etc.

Pericardium: the membranous sac surrounding the heart.

Peristalsis: rhythmic, wavelike muscle contractions of the intestinal tract that move the contents through the tract.

Peritoneum: the membranous lining of the abdominal cavity.

Peritonitis: an inflammation of the peritoneum.

Perosis: deformity of the leg bones resulting in the tendons of the hock joint slipping out of place and twisting of the leg. Common causes are nutritional deficiencies of manganese, choline and perhaps other vitamins.

Persistency: the trait of laying at a high rate of production for an extended period of time.

pH: degree of acidity or alkalinity. Expressed as the logarithm of the reciprocal of the hydrogen ion concentration. Values below 7 are acid and above 7 are alkaline.

Phallus: the terminal reproductive organ of the male bird that consists of grooved phallic folds. Size and structure varies with species.

Pharynx: opening from the mouth to the larynx.

Pheasant: chicken-like ground dwelling birds that can fly well for short distances. There are many types but the Ringneck pheasant (*Phasianus colchicus*) is commonly used for meat and hunting preserves. It is native of Asia.

Phenotype: visual or performance characteristics of a bird that result from both genetic and environmental influences.

Photoperiod: hours of light and dark provided to birds per 24 hours; usually expressed as "hours L: hours D".

Photoperiodism: the physiological and behavioral responses of birds to light and changes in time of exposure, light color, light intensity and sequences or patterns of exposure.

Photoreceptors: cells or tissues that respond to light photons and convert them into a biological signal. The eye is a receptor for the purpose of vision. In the bird the hypothalamus functions as a receptor for the purpose of reproduction.

Photorefractory: the bird, following prolonged exposure to light, becomes less responsive to light stimulation. Recovery of light sensitivity can occur following exposure to short-day lighting for 40 to 80 days.

Photosensitive: capability of the bird to respond to light stimulation. Major factors are species, age, previous light exposure, and characteristics of the light.

Phylogeny: the development or line of descent of a group of birds such as breed or strain.

Physiological zero: embryonic development is already in progress at the time of oviposition after which it slows as the egg cools. Physiological zero (25 to 27°C; 77 to 80.6°F) is the temperature at which embryonic growth stops as the egg is cooled.

Physiology: science pertaining to the functions and vital processes of living organisms.

Phytase: an enzyme added to poultry diets to catalyze the release of P bound to phytate and improve P utilization.

Phytate phosphorus: P bound to an organic molecule. Organic P.

Phytogetic: essential oils and other plant-derived products that when fed have a beneficial effect on the host by influencing intestinal microflora.

Phytotoxins: toxins from plants.

Pica: an abnormal preference for unusual, unnatural or inedible things to eat.

Pick or picking: see Pluck.

Pickout: damage to the vent, cloaca and oviduct caused by pecking or cannibalism.

Pigeon: birds of the *Columbidae* family that are produced for meat, usually as squab. Other varieties are produced for racing, homing and exhibition.

Pigeon pox: a viral infection of pigeons similar to fowl pox in chickens. A vaccine of pigeon pox has been used against fowl pox in chickens.

Pigmentation: color in skin, beak, fat and egg yolks produced by the yellow, xanthophyll-type of pigments in the diet. The intensity of pigmentation in the skin and egg yolks is economically important even though it has little or no effect on nutritional quality.

Pineal gland: a small gland located in the triangular space in the brain between the two cerebral hemispheres and cerebellum. Secretes melatonin in a cycle that is strongly light dependent. Melatonin affects the circadian pacemaker, body temperature cycles, feeding activity, locomotive activity and sleep as well as acting as a scavenger of free radicals.

Pin feathers: a feather just emerging from the skin, usually to replace a feather lost due to molt or accident.

Pinion: the last joint of the bird's wing. Pinioned birds have the last joint removed or bound to restrict flight.

Pip, pipped, pipping: the act of breaking through the shell by an embryo during the hatching process. "Pips" refers to egg or hatch residue in which the embryo pipped the shell but did not continue the hatching process. An internal pip is an embryo that has pierced the membranes into the air cell but has not pierced the shell (external pip).

Piperazine: a type of drug used to treat birds for roundworms.

Pituitary: an endocrine gland at the base of the brain that secretes several hormones, including those that stimulate the gonads. It is affected by feedback from the gonads and other glands, especially the hypothalamus, as well as directly or indirectly by light exposure.

Place: to rank birds or products during judging contests.

Placed: moving chicks to brooding areas or farms.

Placings: ranking of birds or products during judging contests.

Plasma: the fluid, including clotting constituents, remaining after cells have been removed from blood.

Pluck: to pull feathers from the skin. May be referred to as pick or picking. Usually done by machine following dipping the dead bird in hot water. Waterfowl may be dipped in hot wax to make plucking easier.

Plumage: the feathers or feather covering of a bird.

Plumules: soft downy feathers or underfeathers.

Plymouth Rock: a large breed of chicken of the American Class that is one of the base stocks for meat type commercial birds.

Pneumatic bones: bones into which air sacs extend or which are connected to the tympanic and nasal cavities. Pneumatic bones result in weight reduction of the skeleton, which is an adaptation for flight. Pneumatic bones may include the humerus, coracoid, pelvis, sternum and vertebra.

Poikilotherm: an animal that has body temperature that fluctuates with the environmental temperature. Cold blooded. Avian embryos are poikilothermic during most of the embryonic development period. Precocial embryos may develop some homeothermy before hatching, then rapidly thereafter. Altricial embryos develop homeothermy more slowly.

Point of lay: the period when the bird is physiologically ready to begin egg production. Outward indications in the chicken include enlarged comb and wattles that are bright red and the spreading of the pubic bones as well as the space from the pubic bones to tip of the keel.

Polylecithal: much yolk; see Yolk.

Pores (of shell): very small tubes or holes in the eggshell from the exterior surface to the interior surface. Their shape, size, branching, number and distribution vary with species and strains. The primary function is exchange of gases such as oxygen and carbon dioxide as well as water vapor.

Positive white: permanent white color in the face or earlobes where red is the normal color.

Posterior: at or toward the rear.

Post-mortem inspection: inspection performed on the carcass of the bird after slaughter.

Post-ovulatory follicle: the ruptured ovarian follicle after the ovum has been released (ovulated). It has some hormone production activity but quickly undergoes atresia and is not comparable to the corpus luteum of mammals. There is some evidence to suggest it produces a hormone involved in movement of the egg from the shell gland.

Potable: drinkable, implying good quality and safety.

Poulard: a young female chicken with ovary(s) removed to cause the bird to have more desirable meat. Not practical for modern commercial meat birds. Plumage patterns and colors resemble those of the male. Compare Capons.

Poulet de Bresse: a specialty meat chicken raised in the Bresse region of France having coral-red combs, white feathers and blue legs. They are range-reared until the last two weeks when they are confined and fed white corn and whole milk.

Poult: a young bird, especially turkey or pheasant.

Poulterer: one who deals in poultry and game.

Poultry: domestic fowl such as chickens, turkeys, guineas, geese and ducks that are raised for meat, eggs, feathers, or other products.

Poussin: a meat type chicken processed at an early age and small weight (1 to 2 lb) as a specialty product. Similar to Cornish Game Hen.

Pox: viral disease mostly affecting the skin and oral cavity; often species specific; controlled by vaccination.

Prebiotics: dietary ingredients that are not hydrolyzed or absorbed by the upper gastrointestinal tract but are fermented by beneficial bacteria in the lower part of the tract and improve the composition of microflora.

Precocial: birds that are covered with down at hatching and also are mobile and quickly leave the hatching area. Compare Altricial, Nidicolous, and Nidifugous.

Precocious: showing early or premature development, either physical, sexual or mental, beyond that normally expected for the age.

Precursor: a preceding substance. In nutrition it is a substance that, following ingestion, is metabolically converted to another substance that is more useful to the animal.

Preen gland: see Uropygial gland.

Preening: the bird spreads oil from the uropygial or preen gland over the feathers for conditioning and protection of the feathers and to make them more water repellent.

Preferential mating: in a flock a male may mate many times with some females but few times or none with other females, thus contributing to infertility.

Premaxilla: upper beak.

Premix: when ingredients such as vitamins and minerals are used in very small amounts in the diet they are first mixed with a portion of another ingredient, such as ground corn, and then added to the main mixture.

Primaries: large wing or flight feathers (remiges) that are attached in the metacarpal and phalangeal area (hand) of the wing. There are approximately 10 in the chicken, but may vary with species. The proximal end of the feather is protected by smaller feathers or coverts.

Primary host: an animal in which a parasite completes its life cycle.

Primitive streak: an early development stage of the avian embryo that appears after approximately 6 to 8 hours of incubation.

Probiotics: see Direct-fed microbials.

Processing: 1) related to poultry it refers to the slaughter, defeathering, evisceration, dressing, and cutting into portions of the carcass. Further processing may proceed through cooking and preparation for consumption. 2) Related to eggs it refers to washing, candling, sizing, packaging and, in some cases, breaking and selling as egg products.

Proctodeum: see Cloaca.

Production efficiency: See Feed Conversion Ratio and Feed Efficiency.

Productive energy: energy that is available to the animal for growth, egg production, work or storage.

Progeny test: evaluating or measuring offspring performance to assess the parents.

Progesterone: a hormone produced in the walls of the largest follicles in the ovary. It has functions associated with ovulation, production of avidin, and shell formation.

Prolapse: the failure of the oviduct, especially the vagina, to return to its proper position after oviposition or egg laying.

Proportioner: a device to meter medications or other substances into the drinking water.

Protein: organic compounds comprised of amino acids. Required for proper nutrition of the birds, however, formulation is based on individual amino acid requirements when those are known.

Proteinated: chelation of soluble salt with amino acids or protein.

Protozoa: a type of animal, usually one cell and microscopic, that includes the coccidia that cause coccidiosis and the organism (*Histomonas meleagridis*) that causes Blackhead disease.

Proventriculus: the portion of the digestive system that lies between the esophagus and gizzard. The glandular stomach.

Psittacine: birds of the parrot family.

Psittacosis: the disease Chlamydiosis in psittacine birds.

Psychrometer: an instrument having both wet- and dry-bulb thermometers used to determine moisture in the air.

Psychrometric chart: a nomograph used to determine relative humidity, absolute humidity and dew point from wet- and dry-bulb thermometer measurements. Psychrometrics is the relationship between mixtures of air and water vapor at various temperatures.

Pteryla: the areas of the skin from which feathers grow. Also Feather Tracts. For detailed descriptions of feathers and feather tracts see: Lucas, A. M., and P. R. Stettenheim, 1972. Avian Anatomy – Integument, Parts I and II. Agriculture Handbook 362. U.S. Government Printing Office, Washington, D.C.

Pubis: part of the pelvic girdle. The distance between the thin ends of the pubic bones is used as an indicator of productivity of the hen.

PUFA: polyunsaturated fatty acids. See also MUFA.

Pullet: a female chicken less than one year old. May be applied to those prior to the age of sexual maturity (beginning of egg production) or to those through one year of egg production.

Pullorum: a disease caused by *Salmonella pullorum* resulting in high mortality in young birds. It can be transmitted through the egg from the hen, contamination of the egg, and in contaminated feed. Prevented by proper sanitation and by blood-testing the breeder stock to identify and remove those carrying the organism.

Pulmonary hypertension syndrome: see Ascites.

Purebred: the offspring of a cock and hen of the same breed.

Pygostyle: the fused bone at the tip of the tail (coccygeal vertebrae).

Pyridoxine: a B-complex vitamin (B₆). A deficiency results in inhibition of early embryonic growth with mortality peaks days 8 to 14.

Pyrogen: a substance that can cause a fever.

Quail: small gallinaceous game birds of various types found on most continents. The Bobwhite, native to North America, has economic value for meat and hunting. Several other types of quail are also indigenous to North America. Coturnix or Japanese quail have economic value for both meat and egg production. Coturnix are migratory, Bobwhite are not.

Quail Bronchitis: a viral respiratory infection of quail that often causes high mortality. Although distinct from infectious bronchitis of chickens, it has many of the same lesions and clinical signs.

Qualitative restriction: control of nutrient intake by the feeding of lower quality diets.

Quantitative restriction: control of nutrient intake by feeding reduced amounts of the diet or by reduced feeding time.

Quarantine: the maintenance of birds in isolation for a specified period of time to determine if they have an infection, to prevent the spread of infection, or other purpose in the biosecurity system of a poultry operation.

Quaternary ammonium compounds: a group of chemicals commonly used in poultry operations as disinfectants.

Quill: the hollow base portion (calamus) of large, mature feathers. It contains a blood supply in the growing feather and the tip is embedded in the feather follicle of the skin.

Rachis: the portion of the feather shaft having barbs and barbules.

Radiation: heat transmission from warmer to cooler surfaces by waves without physical contact of the heat source and the receiving object.

Radius: the smaller of the two bones of the forearm of the wing.

Rale: an abnormal sound, as rattling or bubbling, during breathing that usually indicates a respiratory disease condition.

Random Sample Test: a type of performance comparison in which random samples of birds from commercial sources are placed in the same facilities with the same management and environment. The test may be with either meat or egg production type birds.

Range production: birds for meat or egg production are maintained with free access to pasture.

Range shelter: a structure, usually portable, that has a roof with or without side walls and perches to provide shelter for birds on pasture.

Ration: the amount of feed allowed per day or time period. See Diet.

Ratite: member of the group of flightless birds that includes ostrich, emu, cassowary, kiwi and rhea. Some are commercially produced.

Ready-to-Cook (RTC): processed young poultry and its parts which are ready to be cooked with very little additional preparation.

Recessiveness: the allele in a heterozygote that is suppressed by its partner and is expressed only in the homozygous state.

Reciprocal mating: crossing two strains or groups in two ways, i.e., A males with B females and B males with A females.

Recombinant: an individual in which recombination has occurred.

Recombination: the presence of new gene combinations in an individual not present in either parent and may be introduced from other organisms.

Recrudescence: the regrowth or rejuvenation of a tissue, organ or system after it has regressed. An example is the reproductive system rejuvenation following a feather molt.

Rectrices: the large main tail feathers.

Rectum: see Cloaca.

Red blood cell: the blood cell that contains hemoglobin and a primary function of carrying oxygen to the body tissues. The avian red blood cell is nucleated.

Red hocks: a condition in hatching chicks in which the hocks become reddened in prolonged struggle to hatch. There are numerous causes.

Red mite: an arachnid parasite, very small, that feeds on the blood of the bird at night but does not stay on the bird during the day.

Refractoriness: unresponsive to a stimulus, e.g., light. See Photorefractory.

Relative humidity: the amount of moisture in the air compared to the maximum that it could hold at that temperature. Usually expressed as a percentage.

Remiges: the large flight feathers of the wing. See Primaries and Secondaries.

Renal: refers to kidneys.

Renal portal system: venous circulation in which blood from the legs and lower intestines is diverted through the kidneys before returning to the heart. A consideration in procedures in which substances are injected into the legs.

Resistant: when used in regard to antibiotics or drugs, it indicates that the micro-organism is affected less than expected, or not at all, by a specific substance.

Respiratory system: consists of the primary parts: trachea, bronchi, lungs and air sacs. The avian lung is a flow-through system with air passing through to the air sacs and returning through the lungs in exhalation. The main functions are oxygen and carbon dioxide exchange in the lungs, vocalization in the syrinx, and thermoregulation, mostly by evaporative heat loss. The lungs do not expand and contract.

Resting metabolic rate (RMR): metabolic rate measured when birds are in their thermoneutral zone and resting but not fasting. See Basal metabolic rate.

Restricted or controlled feeding: regulation of feed intake to maintain a desired growth rate, body weight or other characteristic. Restriction may be in the form of reduced daily intake or skipped feeding on one or more days per week in various patterns. Restriction may also be in the form of quality of the diet.

Rhea: a large non-flying ratite bird of South American origin, smaller than ostrich and emu, that is sometimes used for meat production.

Rhode Island Red: a base stock of chickens of the American Class used for commercial production of brown eggs; also a useful stock for home flocks.

Riboflavin: a vitamin of the B-complex. A deficiency causes stunting of the embryo with multiple abnormalities and high mortality.

Rice hulls: a by-product of rice grain production that can be used as a litter material.

Rickets: abnormal bone growth resulting from dietary deficiencies or imbalance of vitamin D, calcium and phosphorus.

Ridge ventilation: an opening is left at the peak or ridge of the roof allowing warm air to passively rise out of the house. Fans may be placed in a closed-ridge roof to provide forced ridge ventilation.

Rigor mortis: the stiffening of muscles following death. It is an important consideration in processing and tenderness of the muscle.

Roach back: a deformed, humped back.

Roaster: a young male or female chicken that is suitable for cooking whole in an oven; usually larger than a "broiler", averaging 4 to 6 lb.

Roche fan: a color scale for measuring yolk pigment level or intensity.

Roost: a place with perches for birds to rest or sleep.

Rooster: a male chicken. See Cock and Cockerel.

Rose comb: a type of small, compact comb that is dominant to single comb.

Roundworm: *Ascaridia galli* is one of the most common poultry worm parasites. Generally found in the central part of the intestine. Worm infestations have been reported to be associated with reduced allergenic reactions. See Ascarid.

Run: an area outside of the house to allow outdoor activity.

R-value: a measure of the ability of materials to resist the transfer of heat.

Rye: a cereal grain that can be used as a feed ingredient.

Saddle: the rear of the back extending to the tail feathers and covered with long, pointed feathers (saddle feathers) in the male.

Salmonellosis: a disease caused by one of the bacteria of the *Salmonella* type. See Pullorum, Paratyphoid and Fowl typhoid or Typhoid.

Salt: the chemical sodium chloride (NaCl) that is required in the diet.

Salt glands or nasal glands: glands located on the beak near the nares and eyes that function to remove excess salt from the blood (osmoregulatory) and are controlled by osmoreceptors. Occurs more commonly in marine birds; may be present but non-functional in some species.

Sanitation: maintaining healthful and disease free conditions through cleanliness, treatment of the environment with anti-microbial agents, prompt removal of wastes and other preventative measures.

Satiety: having had enough, e.g., having eaten until full or satisfied.

Scabby hip syndrome: injuries of the back and hip areas of meat birds, usually caused by toe nail scratches and results in downgrading of carcasses.

Scald: dipping birds in hot water (approximately 128 to 140°F) for a specific time to loosen feathers for plucking.

Scales: horny, thin, flat plates of tissue covering the shanks and feet.

Scaly leg: scales on the legs and feet may be raised with encrustations. Caused by a type of mite (arachnid) that burrows under the scales. Can be controlled by treatment with oils.

Scotophase: the period of darkness between dusk and dawn or lights-off and lights-on (light/dark interphase to dark/light interphase).

Scratch: the habit of chickens and some other birds of scraping their claws across the ground to uncover food.

Scratch feed: whole grain, cracked grain or pellets that are scattered on the litter or ground in some feeding systems, especially small poultry units.

Seasonal breeder: a bird that is in an active reproductive state during a specific season of the year. Commonly respond to light as the determining factor, however, temperature, rainfall, food availability and other factors may be the primary determinant.

Sebum: the oily substance secreted by the uropygial gland and a few sebaceous glands. See Uropygial Gland.

Secondaries: a second group of large wing flight feathers located nearer to the body than the primaries and which cover the primaries when the wing is normally folded.

Secondary sexual characteristics: differences between females and males such as feather color and shape, comb size and shape, pubic bone separation, body size, behavior and voice.

Second cycle hens: laying hens that have been force-rested and are in the post-rest or post-molt laying period.

Secretion: to form and release from a gland or tissue, e.g., albumen in the oviduct.

Selenium: an essential dietary element in small amounts; a deficiency can cause the accumulation of fluid under the skin and mortality in embryos. Large amounts can be toxic.

Sensible Heat: heat that can be felt by the body. Heat that causes an increase in temperature when absorbed by a body.

Sentinel birds: susceptible birds placed in near proximity to other birds to detect latent infections or introduced infections.

Septicemia: a systemic infection in the blood; may include toxins from the bacteria.

Serological test: examination of blood serum to determine the presence and quantity of antibodies for a specific pathogen.

Serotype: organisms characterized by specific antigens.

Serum: the clear fluid remaining after all cells and clotting constituents are removed from blood.

Set or setting: 1) to place eggs in an incubator for incubation for approximately 18 days (chicken) before moving to another machine for hatching. 2) May also refer to a batch of eggs that were set together.

Setter: the incubator or incubation machine in which eggs are placed for incubation for approximately 18 days (chicken) prior to moving to a hatcher.

Sex: gender

Sex chromosome: the pair of chromosomes (designated as Z and W in the bird) that determine the gender of the individual. In the bird the female is the heterozygote (ZW), thus determining gender of the offspring, whereas the male is the homozygote (ZZ).

Sexing: determining the gender of a chick (or older bird) by cloacal examination, feather color, feather length, instrument or DNA. See Sexor and Sexing scope.

Sexing scope: an instrument similar to a proctoscope used to view the testes through the large intestine wall to determine gender of the chick.

Sex linked: characters that are associated with one gender due to the gene being located on the sex chromosome. Some of these characters can be used to identify the sex of a chick at hatching (auto-sexing).

Sex ratio: the proportion of males and females in a group. The primary sex ratio is the proportion at the time of fertilization. The secondary sex ratio is the proportion at the time of hatching and is influenced by embryo mortality. The tertiary sex ratio is the proportion at any given time after hatching. The primary and secondary ratios will usually approximate 1:1, however, the secondary ratio will tend to be skewed toward more females in chicks hatched from older breeder flocks.

Sexor: a person who determines the gender of a newly hatched chick or other bird. Usually done by examination of the cloacal anatomy, feather growth or feather color.

Sex reversal: a gender change, usually from female to male. It may involve phenotype change only or functional changes in which the left ovary becomes nonfunctional and the right ovary develops some testes-like tissue. Usually considered a pathological condition.

Sexual dimorphism: differences between males and females in appearance, physiology and production.

Sexual maturity: the age at which the female first lays an egg and the male produces semen that is capable of fertilizing an egg. Varies widely among domestic species (e.g., 7 to 8 weeks of age for Japanese quail and 28 to 30 weeks for turkeys).

Shackles: metal or plastic hangers which hold poultry securely by the feet during processing

Shaft: the quill of a large feather, including the portion to which barbs are attached.

Shank: the lower portion of the leg, usually covered with scales. It is the tarsometatarsus connecting the toes to the tibia.

Sheen: the luster, glossy or glistening effect seen on the feathers, often appearing green or purple and influenced by lighting.

Shell gland: the sac-like portion of the oviduct in which the forming egg spends about 20 hours during which the shell is secreted and formed. Sometimes called Uterus. See Oviduct.

Shell membrane: consists of two membranes. The outer membrane lines the inner surface of the shell, whereas the inner membrane surrounds the egg albumen. A space may form between the membranes at the large end of the egg, which is called the air space or air cell that has an important embryonic function in the hatching process. See Air cell.

Short day: a daylength that is insufficient to stimulate hormone release and gonadal growth.

Shoulder girdle: the group of bones that connect at the anterior, dorsal part of the body and includes the clavicle, scapula and coracoid to which the wing (humerus) is attached.

Shuttle program: switching among treatment medications to avoid increased resistance.

Siblings: brothers and sisters.

Sib-testing: evaluation of the breeding potential of an individual based on performance of its siblings as well as its own performance.

Sickles: the large curved feathers of the tail of the mature male chicken. They may be separated into primary or main (prominent uppermost pair) and lesser sickles.

Side sprig: a pointed growth on the side of a single comb.

Side ventilation: poultry houses designed with air intakes along the side. Exhausts may also be on the opposite side to result in cross-ventilation.

Sieve: a tool for separating small from large particles, often consisting of screens with various size openings.

Silkie: the type of feather characteristic of the Silkie breed in which the barbs of the feathers are not locked together thus giving the feather a fluffy texture.

Silver and gold: plumage colors in which Silver is dominant to Gold. The alleles are sex-linked and can be used as auto-sexing characters to determine the sex of the chick at hatching.

Single Comb: a comb type having a “blade” that is usually large and vertical in the male. It is recessive to Rose and Pea Combs.

Single stage incubation: an incubation system or incubator that contains only one age of embryo. It allows more precise control of age-appropriate environmental conditions for the embryos. See Incubator and Multistage incubation.

Sinus: cavities within bone or tissue, but commonly referring to the cavities in the skull that open into the nasal passages.

Sire: the father.

Sire family: offspring of a cock mated with 1 or more hens, so that all are full or half siblings.

Sitting: to sit upon and incubate eggs. The hen that sits on eggs is a “sitting hen” or a “broody hen” and exhibits broodiness behavior. [A “set” of eggs may be placed under a “sitting” hen for her to “sit” on them during incubation]

Skein: a flock of wild fowl, especially geese.

Skeletal photoperiod: a light period interrupted by one or more short dark periods that the bird senses as a single light period.

Skeleton: the bones of the body; the bony framework that supports all other organs and tissues.

Skin: the organ comprising the outer covering of the body. See Integument.

Slatted floor: a floor constructed of strips of wood, plastic or other appropriate material on which birds can stand but that is open enough for the feces to fall through to a collection pit below.

Slip: a male in which the caponizing procedure failed to completely remove all of both testes.

Slipped tendon: see Perosis.

Small intestine: that part of the intestine from the gizzard to the ceca-large intestine junction. It includes the duodenum, jejunum and ileum.

Snood: a protuberance on the head of a turkey that functions in displays, becoming elongated and hanging down on one side of the face.

Soft-shelled eggs: eggs laid with little or no calcareous shell.

Soluble grit: see Grit.

Somites: block-like segments of mesoderm that first appear in the embryo at about 22 hours of incubation and will give rise to bones, muscles, etc.

Sorghum: a small grain that can be used as a substitute for maize in diets.

Sour crop: a disorder of the crop that often involves fermentation of the contents.

Soybean meal: a feed ingredient produced from soybeans that have been processed to remove oil and to inactivate the anti-nutritional factors of the raw bean. It is a very common feed ingredient as a primary source of protein and secondary source of energy. **Feeding unprocessed soybeans may result in enlarged pancreas and other problems.**

Spangling: a black v-shaped tip to silver or gold feathers or white tip to dark feathers. More feathers affected than in Mottling.

Species: a group of organisms having many characteristics in common and usually can interbreed; a subdivision of genus.

Spectacles: small plastic shields or blinders that can be attached to the beak of hens at the nares to restrict forward vision and reduce cannibalism, feather-pulling and egg eating.

Spectrum: the range of colors in light.

Spent hens: laying hens that have completed their laying cycle(s) and are to be replaced by a young flock.

Spermatogenesis: the process of formation of sperm, including both spermatocytogenesis and spermiogenesis.

Spermatozoa or sperm: the male gamete produced in the testes in the process of spermatogenesis. Deposited in the vagina of the hen at mating and can be stored there for several days.

Sphincter: a ring-shaped muscle around an opening of the body or an organ, which can open or close the opening.

Spleen: a reddish-brown organ located near the liver that is involved in the immune system and blood filtration.

Spike: 1) addition of males to a breeding flock during the breeding cycle. 2) The tapered, cone shaped, rear portion of the rose comb.

Spore: a reproductive cell of some fungi and other organisms. They are usually resistant to disinfectants, heat and drying.

Sport: a bird having a changed appearance from normal due to a mutation.

Spraddler: young chick with legs spread apart (splay) rendering it incapable of standing.

Spur: a stiff, horn-like projection on the inside of the shank, primarily in males. Spur growth is influenced by the sex of the bird but is independent of sex hormones.

Squab: young pigeon still in the nest.

Squat or squatting: a position in which the hen crouches close to the ground in accepting the approach of a male for mating.

Stag: a male. Specifically, a male turkey or tom.

Standard breed: a breed of birds that are of a “normal” or large size in comparison to bantams. See Bantams.

Standard metabolic rate: see Basal metabolic rate.

Staphylococcosis: infection caused by any of the many *Staphylococcus* organisms.

Started pullets: young females that are approaching the beginning of egg production and sexual maturity.

Starter diet: the diet formulated to meet the requirements of the growing chick during the first days or weeks of life.

Starve-outs: young birds that never eat sufficiently to survive after exhausting the residual yolk.

Static Pressure: the difference between inside house and outside atmospheric pressure; can be either positive or negative in the poultry house, depending on whether the fans are blowing air into the house or exhausting from the house.

Sterilize: 1) to remove the reproductive organs or to render them nonfunctional. 2) Also, to remove or kill all microorganisms, often by heat.

Sternum: the breast bone. See also Keel.

Sticky chicks: chicks that hatch with albumen smeared over the down that often is caused by low incubation temperature, high humidity, improper turning and poor quality eggs.

Stigma: the rupture line on the ovarian follicular membrane.

Still-air incubator: small incubators that have no fans to circulate air but depend on convection currents to achieve adequate ventilation.

Straight-run: chicks have not been separated by gender after hatching, but unthrifty chicks may have been removed. Also called “As-Hatched”.

Strain: a group of birds in which breeding and selection has occurred for several generations without the introduction of new stock.

Strain cross: birds resulting from the crossing of two or more strains. Many commercial birds are strain crosses.

Streptococcosis: disease conditions caused by the organism, *Streptococcus zooepidemicus*.

Stress: responses of the animal that include increased adrenal hormones, immunosuppression, decreased reproduction or growth and numerous other physiological reactions to factors or stressors such as disease, malnutrition, adverse environments, noises, crowding, injury, etc.

Strutting: a part of the courting behavior of male turkeys, often accompanied by trumpeting vocal calls.

Stub: 1) a feather beginning to grow or one that has been broken. Stubbing is the process of removing the stub during processing. 2) Down or feather on the shank or toe of a clean legged bird.

Stuck chick: chicks that become stuck in the shell during the hatching process or hatch with shell fragments stuck to the down feathers. Similar to Sticky chick.

Supplement: nutritive substances such as vitamins and minor minerals added to the major base ingredients of the diet. See Additives.

Surimi: washed muscle protein.

Swan: large, long-necked, web-footed waterfowl of the genus *Cygnus*. Domestic use is primarily ornamental.

Sympathetic and Parasympathetic systems: parts of the involuntary or autonomic nervous system that regulate and affect numerous organs and tissues.

Synbiotics: foods with both prebiotic and probiotic properties as health-enhancing foods.

Syndactylism: having abnormal webbing between the toes.

Syndrome: a set of characteristics or signs that are used to identify a disease condition, often before the cause is known.

Synovitis: infectious synovitis or mycoplasma synoviae (MS) caused by an infection by *Mycoplasma synoviae* that particularly affects joints of legs and wings. Can be prevented by flock monitoring and quarantine procedures.

Syrinx: that portion of the upper respiratory tract at the bifurcation of the trachea into the primary bronchi; the site of vocalization in birds. In some species there is an additional resonant apparatus, which has variable structure among species.

Tainted: in regard to meat and eggs it refers to being affected by odors, contaminations, infections, dirt, chemicals, etc.

Tapeworms, cestodes: flat, white, ribbon-like, segmented parasites of the intestine. Require an intermediate host such as earthworms.

Taste: the sensing of flavor; one of the chemically based senses.

T-cells: lymphocytes originating in the thymus that function in recognition and killing of abnormal cells, and assist B-cells.

Telolecithal: poled yolk; see Yolk.

Tenderloin: this boneless, skinless white meat is the pectoralis minor muscle. It comes from the inside of the breast adjacent to the keel bone.

Tendon: tough, fibrous connective tissue connecting muscles to bone or other tissue.

Terata, teratism: grossly malformed embryos; monsters.

Testis: the male gonad. See Male reproductive system.

Therapeutic: healing or curative. A drug given at a therapeutic dose may also be prophylactic or preventative.

Thermogenesis: physiological production of heat.

Thermoneutral zone (TNZ): an ambient temperature in which a bird does not spend energy for active evaporative cooling or regulatory thermogenesis. See Basal metabolic rate. The upper and lower boundaries of the TNZ are upper critical and lower critical temperatures, respectively. The TNZ will vary with species, size, acclimatization and other factors.

Thermoregulation: control of body temperature by changing heat production, heat transport, heat exchange, etc.

Thermotolerance: having resistance to temperature changes.

Thiamine: a B-complex vitamin (B₁). A deficiency may result in polyneuritis, high embryo mortality and many dead chicks in hatching trays.

Thick albumen: the third layer of albumen out from the yolk. It is heavy, thick and contains many mucin fibers giving the albumen shape; it is attached to the inner shell membrane at both ends of the egg. See Albumen.

Thigh: the upper leg, with femur bone, between the knee and the body (pelvic girdle).

Thin albumen: two layers of albumen (the inner thin is between the chalizerous and thick albumen layers and the outer thin is between the thick albumen and the inner shell membrane around the equatorial area of the egg) that contain few mucin fibers. See Albumen.

Thoracic cavity: the chest area containing heart and lungs. There is no diaphragm in birds separating the thoracic cavity from the Abdominal cavity.

Threadworms: see Capillary worms.

Threshold: the level or point at which a stimulus is adequate to cause the first observable response.

Throat: the front part of the neck including the upper part of the passage from the mouth and nose to the crop and lungs.

Throw: when describing negative ventilation systems, it is the distance an air jet travels from the air inlet before its maximum air speed is reduced to 75 fpm.

Thrush: an infection of the mouth, esophagus and crop caused by a *Candida* fungus. See Candidiasis.

Thymus: a gland located along the neck that decreases in size with maturity. It has a major role in the immune system and development of immunity. Source of T-cells (T-lymphocytes).

Thyroid: paired glands in the neck that function to regulate metabolism, growth and feathering. Produces triiodothyronine (T3) and thyroxine or tetraiodothyronine (T4).

Tibia: the primary bone of the lower leg (drumstick).

Tibial dyschondroplasia: a developmental abnormality of the leg, especially in broilers.

Time clock: the clock-like mechanism used to control lighting, ventilation or other regularly occurring events.

Titer: the weakest dilution in which clumping of the antigen will occur in an agglutination test.

Tom: the male turkey.

Torpidity: dormant or inactive; sluggish metabolism and activity.

Torpor: the state of being dormant or inactive. See Torpidity.

Torticollis: involuntary twisting of the neck.

Toxemia: toxins, usually from micro-organisms, have been absorbed and are in the blood.

Toxin: a poisonous material, usually from a biological source.

Trace elements, minerals, supplements: see Additives and Supplements.

Trachea: the respiratory tract tube extending from the larynx to the bifurcation into bronchi; also called windpipe.

Transgenesis: transfer of genetic material from one organism to another.

Trapnest: a nest used in pedigree breeding which holds the hen until identified and released.

Treading: mounting of the female by the male during mating.

Trematodes: leaflike flatworms (flukes) that may afflict various parts of the body but are not usually a serious problem. Require snails as an intermediate host.

Tremors: see Encephalomyelitis.

Trussing: tying the wings and shaping poultry before cooking.

Tumor: a swelling or abnormal growth that may be benign or malignant.

Tunnel ventilation: a closed house having forced ventilation with air inlets in one end of the house and outlets at the other end. In positive pressure houses the fans are in the inlets pushing air into the house. In negative pressure houses the fans exhaust air from the house. Generally, a negative pressure system is used in commercial poultry houses.

Turkey: birds of any of the subspecies of *Meleagris gallopavo*, native to N. America and domesticated by the American Indians. Domestic turkeys are very large, cannot fly and are artificially inseminated on a commercial basis. They produce a high percentage of white (breast) meat.

Turning (of eggs): eggs are turned in nature by the brooding bird and in incubators by automatic turning mechanisms. Eggs are normally turned one to four times per hour from setting until 18 days of incubation (chicken). The most crucial time seems to be from two to seven days. The ideal frequency, angle and embryo age for egg turning may vary with species, strain, breeder age, type of machine and other factors.

Typhoid: disease caused by *Salmonella gallinarum* usually in growing or mature birds. See Fowl typhoid and Salmonellosis.

Ulcerative enteritis: a type of enteritis caused by *Clostridium colinum* in quail and sometimes other species. May cause very high mortality in domestic quail.

Ulna: the larger distal bone in the wing

Ultimobranchial gland: two small glands located in the neck near the branch of the brachiocephalic artery. Produces calcitonin which affects bone resorption and renal calcium and phosphorus excretion.

Umbilicus: 1) the place where the blood vessels supplying the embryonic membranes (yolk sac, chorioallantois and amnion) pass through the body wall. Just prior to hatching the yolk sac is withdrawn into the abdominal cavity and the umbilicus closes and heals as the vessels to the other membranes dry up. See Navel. 2) The opening to that part of the feather calamus embedded in the feather follicle is known as the proximal umbilicus whereas the opening in the feather shaft at the junction of the calamus and rachis is the distal umbilicus.

Unabsorbed yolk: the yolk material remaining in the withdrawn yolk sac at hatching. After hatching it moves directly into the small intestine and is quickly absorbed. The stalk attaching the yolk sac to the intestine remains in the older bird. It is called Meckel's diverticulum and is thought to have some immune system functions.

Undercolor: the color of the fluff portion of body feathers near the skin.

Undergrade: edible shell eggs that do not meet the requirements (standards) for Grade AA, Grade A, Grade B or Checks.

Ureters: tubes transporting urine from the kidney to the cloaca.

Uric acid, urates: the insoluble and primary nitrogen waste product of the bird. A probable adaptation necessary for embryonic development in the shell. Urea is the soluble form of nitrogen waste found in many animals.

Urine: see Uric acid.

Urodeum: see Cloaca.

Uropygial gland: also known as the preen gland or oil gland, it is located under the skin of the back at the place where the tail extends from the back. It is bilobed and secretes a holocrine oily substance (sebum) that the bird uses to preen or dress the feathers to prevent them from drying out and to waterproof them.

USDA: United States Department of Agriculture.

USDA Grade A: ready-to-cook products graded for quality according to official standards administered by the USDA, Agricultural Marketing Service, Poultry Programs. The product conforms to the requirements for "A" quality.

Uterus: see Shell Gland. It has little in common with the mammalian uterus.

Utility or dual purpose strain: a type of bird that is useful for both egg and meat production.

Vaccine: a preparation of dead or attenuated (live but non-virulent) micro-organisms, or proteins from them, which when introduced into the body initiates the development of immunity against that micro-organism or toxin.

Vagina: the posterior portion of the oviduct. Main functions include oviposition, site of sperm deposition and storage, addition of some cuticle material to the egg. See Oviduct.

Valgus: an abnormal condition in which the legs are bent or twisted outward.

Vane: the part of a feather consisting of barbs, barbules and barbicels that forms the wide portion of the feather on either side of the shaft or rachis.

Variety: a subdivision of a breed; usually distinguished by comb type, feather color or feather pattern. See Breed.

Vas deferens: the convoluted white tube that carries semen from the epididymis of the testes to the phallus in the cloaca.

Vector: an animal or insect that carries or transmits a disease or parasite from one host to another. **Compare Fomite.**

Vein: that part of the circulatory system that carries blood back to the heart.

Velogenic: highly virulent or pathogenic.

Vent: the external opening of the cloaca. See Cloaca.

Ventilate: the movement of air in, through and out of a space.

Ventral: the underneath portion of the body as opposed to dorsal or back.

Ventriculus: See Gizzard.

Vent sexing: a procedure for determining the sex of newly hatched poultry by examination of the cloacal anatomy. See Sexor and Sexing.

Vertical integration: in the poultry industry a company (Integrator) would have breeder multiplier flocks (probably contract producers), hatchery, pullet or broiler grower farms (usually contract producers), broiler or egg processing plants, egg production farms (probably contract), feed mill, transportation units, marketing units, and related operations. These are sometimes referred to as broiler or layer complexes. Also defined as when two or more dissimilar enterprises, such as a feed mill and a hatchery, are combined in the production, processing or marketing of a product.

Viability: ability to live and develop. See Mortality.

Vices: bad behaviors that include cannibalism, feather pulling, toe-pecking, egg eating, flightiness, hysteria, etc.

Viral Arthritis: a reovirus infection that affects tendons, synovial membranes and the heart. The condition is more apparent in larger birds.

Virulence: highly infectious and able to overcome natural defenses.

Virus: very small microscopic agents causing diseases including Infectious Bronchitis, Newcastle Disease and Fowl Pox. Capable of multiplying only inside a living cell.

Viscera: the organs and tissue within the abdominal and thoracic body cavities.

Visible radiation: that portion of the electromagnetic spectrum having wavelengths to which the eye is sensitive, lying between ultraviolet and infrared wavelengths.

Vitamin: several unrelated organic substances required in small amounts by the body for normal metabolism and development that are provided in the diet or, in a few cases, may be synthesized in the body.

Vitamin-mineral premix: a mixture of vitamin and minerals in appropriate proportions to supply those ingredients in a complete diet. Generally promotes efficiency and accuracy in the feed mixing process.

Vitelline membrane: the non-cellular membrane that surrounds the yolk material and blastoderm of the egg yolk. Two inner layers are ovary-derived and 2 outer layers are oviduct-derived. The outer 3 layers are coatings on the inner layer, which is the vitelline membrane.

Viviparous: type of animal that brings forth living young, e.g., mammals. See Oviparous and Ovoviviparous.

Walnut comb: small type comb resulting from the presence of rose and pea genes. Interbreeding can give birds with walnut, pea, rose or single combs.

Waltz: a common part of the courting behavior of male chickens.

Waterfowl: swimming birds; in domestic birds this includes ducks, geese and swans.

Water glass: sodium silicate when mixed with water forms a clear, thick liquid that historically was used to preserve eggs.

Wattles: structures of flesh and skin hanging from the chin or throat of birds such as chickens, turkeys and a few other species. It is often red, blue or yellow and is larger in males.

Wax plucking: a bird carcass is dipped into melted wax, which is allowed to cool and then stripped off to remove the feathers. Used primarily for waterfowl.

Weather: day-to-day variations of meteorological variables, whereas climate is the long-term expression of weather.

Web: 1) Part of the feather on either side of the shaft consisting of barbs (see Vane). 2) Flat skin between the toes, especially in waterfowl. 3) A triangular stretch of skin on the wing front between the shoulder and the wrist.

Wet-bulb thermometer: a thermometer with the bulb covered with a wet cloth or gauze used to measure relative humidity. When placed in moving air the evaporation of moisture from the cloth cools the thermometer and when compared to a dry-bulb thermometer temperature using tables (see Psychrometric chart) the relative humidity can be determined.

Whey, dried: a product produced from the thin milk portion remaining from cheese-making and other procedures. It can be used as a feed ingredient.

White (of the egg): see Albumen.

Whole-carcass rinse (WCR): method of determining presence of Salmonella, Campylobacter and other microbes on post-chill poultry carcasses.

Whole eggs: consist of yolk and albumen. For the various egg product classes – liquid, frozen and dried – the yolk and albumen are separated during the breaking process and later remixed to formulate whole eggs in accordance with customer specifications.

Windpuff: air from a punctured air sac that accumulates under the skin of the neck and anterior body. The air can be released by puncturing the skin with a sterile needle.

Wing: the forelimb of the bird. Developed for flight in most birds whereas in others it is used for swimming or balance in running.

Wing band: a metal or plastic identification tag fastened to the wing web or around the upper wing or humerus (wing badge).

Wishbone: a common name for the v-shaped clavicle bone in the breast.

Withdrawal diet: the diet fed to birds for a specified time prior to slaughter and contains no antibiotics or other compounds that might be undesirable in the meat for human consumption.

WOG: whole young poultry without giblets and neck in the bird's net weight. WOG refers to **With Out Giblets**. They may be split, quartered or cut into 8 or 9 pieces for the fast food/service business.

Xanthophyll: a fat soluble yellow pigment found in plants that is deposited in the skin, fat, and egg yolk giving them a yellow color. Synthetic pigments are available to provide the same type coloring. See Pigmentation.

Xerophthalmia: a conjunctivitis condition of the eye caused by a vitamin A deficiency.

Yellow pigment: see Xanthophyll.

Yolk: the ovum of the bird containing yolk material and the living cell or blastoderm. The avian yolk is polylecithal (much yolk) and telolecithal (living portion on one pole and only that portion divides). It is contained in the yolk membrane (see Vitelline membrane).

Yolk sac: the embryonic membrane that grows around the yolk enclosing it and that is involved in digestion and absorption of yolk material. It is pulled into the abdominal cavity (yolk sac retraction) of the 19-day embryo (chicken) where absorption continues for a few days following hatching.

Yolk sac retraction: see Yolk Sac.

Yolk spheres: closely packed polygonal sac-like structures containing yolk material that make up the major portion of the egg yolk.

Zoonotic diseases: those that can be transmitted from animals to man.

Zygote: the fertilized egg before development (cleavage) begins. Fertilization occurs in the infundibulum of the oviduct.

ADDITIONAL SOURCES:

Forscey, L.A. 1969. Multi-Lingual Poultry Dictionary. European Federation of Branches of the World's Poultry Science Assoc., Edagricole Bologna, Italy.

Malone, P., G. Donnelly, W. Leonard. 1998. The American Standard of Perfection. American Poultry Assoc., Inc., Mendon, MA. [newer editions are available]

European Federation of the World's Poultry Science Assoc. 1983. Terms used for parts of poultry in different languages. World's Poult. Sci. J. 39:64-73.

Lewis, P.D. and G.C. Perry. 1990. Glossary of avian photoperiodic terminology and methods of expressing lighting regimens. Br. Poult. Sci. 31:677-684.

Poultrypedia website: <http://www.poultryhub.org/index.php/Contents>

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